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ABSTRACT

This document reports a study that examined implementation processes for new workplace practices--nonterritorial offices--in five international organizations in four countries. The organizations are IBM and Ernst & Young in the United Kingdom; Digital Equipment's Natural Office in Sweden; SOL Cleaning Company headquarters in Finland; and Shimizu Institute of Technology in Japan. Part I compares the "success" of the projects according to whether cost- or business-driven, solution- or process-oriented, and strategic- or independent-initiative strategies were applied. Project success is measured across such factors as user satisfaction, work effectiveness, project duration, project acceptance, and implementation cost. Findings are discussed for such other factors as project innovativeness and organizational learning. Part II describes in detail the findings from each organization. For each company and site studied are a brief description of the innovation occurring at the organization; a summary of the implementation process across time for all sites examined; an analysis of user satisfaction and work effectiveness using the combined data collection techniques; a comparison of the implementation processes across all sites and the subsequent changes in employee satisfaction and work effectiveness; and lessons learned and conclusion sections discussing research findings. Appendixes include descriptions of three sites, instruments, and 30 references. A separately published "Summary Report" is appended. (YLB)

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Workscape 21

The Ecology of New Ways of Working

Implementing Innovative Workplaces

Organizational Implications of Different Strategies

Franklin Becker
Kristen L. Quinn
Andrew J. Rappaport
William R. Sims

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Foreword

The International Workplace Studies Program, formerly the International Facility Management Program, is a research program based in the College of Human Ecology at Cornell University in Ithaca, New York. The program was launched in 1989, and is supported by a consortium of private and public sector organizations in the United States, United Kingdom, Europe, and Japan. The IWSP mission is to generate research-based information related to the planning, design, and management of the workplace that can contribute to the development of more competitive and effective organizations.

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Introduction

Over the past three years the International Workplace Studies Program (IWSP)[1] has conducted a series of case studies on "non-territorial" offices as part of a larger study examining the ways in which private and public sector organizations are trying to manage their space more efficiently.[2] During this time several organizations participating in the research have implemented a number of non-territorial projects at different locations within the same country, as well as in different countries. Some of these projects have been closely linked to each other conceptually and organizationally, while others have been relatively independent on both these dimensions. In both cases, either in a planned or unplanned fashion, what typically began as a small-scale project, often involving 25 to 65 people at a single site, has often evolved into a form of corporate standard practice.

The range of organizational issues associated with the evolution from small-scale project to larger-scale practice corresponds with IWSP members' interest in the innovation process; that is, in how new facility practices and designs can be implemented successfully on a large scale within organizations. Of immediate concern to many organizational leaders is how initial resistance from both staff and management to proposals to implement innovative practices can be overcome. Of longer term interest, and potentially greater importance, is understanding how different facets of new workplace strategies influence their long-term success.

The transition from small projects to a corporate-wide program is typically a difficult one for a variety of reasons. Organizations that are willing to allocate additional human, time, and financial resources for a small-scale project often do so with the expectation that once the wrinkles are ironed out of the smaller project, full-scale implementation of the resulting "standard practice" can move forward with relative ease and speed. The commitment to a well-developed planning process surrounding the development and implementation of the first generation project is, for many organizations, not viewed as fundamental to subsequent projects, but more as a means of getting it right the first time.

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[1] Formerly the International Facility Management Program.

[2] Becker, F., Sims, W., & Davis, B., (1991). Managing space efficiently: Final summary report. New York: Cornell University International Facility Management Program, NYS College of Human Ecology.

Organizations that have implemented non-territorial offices in different countries or at different sites within the same country, but not in a conceptually and organizationally linked way, raise questions about the value of a strategically developed program (strategic initiative) as opposed to projects implemented independently of one another (independent initiative). Both situations provide a good opportunity to investigate a variety of aspects of organizational learning; that is, the manner in which organizations capture experience and exploit it to gain a competitive edge over time.

In addition, organizations that implement projects with the ultimate goal of reducing costs associated with office space—rather than increasing overall employee performance—bring up the issue of whether companies should be focusing on short-term facility goals or long-term business goals. Concentrating on short-term goals, such as a reduction in office space/lease costs, can be less costly in terms of time and resources (and less risky), but may result in only small increases to the business. Long-term goals, such as determining a more effective way of working, may be more expensive than the strategy mentioned above, but could ultimately change the way in which organizations conduct business, resulting in large increases to the organization as a whole.

Finally, many differences exist between new workplace strategies that are process- or solution-driven. Some companies begin with a solution and then work backwards to form the process around a predetermined solution, while other organizations focus on the process and allow employees to develop their own solution within well-defined parameters (e.g., total cost of the project or the amount of space available). Both of these methodologies have their benefits and disadvantages. One may be easier to implement across time and will save the organization resources in the overall implementation process. The other may be more time intensive, but will most accurately support the employees' individual working styles.

Key Research Questions

The objective of the ***Implementing Innovative Workplaces*** study was to explore a number of these issues by examining the evolution of new ways of working, in particular non-territorial offices, as these practices were implemented in larger-scale projects and as they expanded from one site to another and from one country to another. Specific research questions were as follows:

- What factors (e.g., planning and design process, nature of technology, design of the setting) tend to change the most as projects evolve?
- What aspects of the new workplace system tend to become standardized or uniform?
- As organizations expand their implementation of new workplace strategies (within or across sites), does employee response tend to improve, remain the same, decline, or is there no consistent pattern at all?
- What differences are there in terms of cost and employee response (satisfaction, work effectiveness) as a function of whether the workplace system is primarily cost-driven versus business-driven (see below for definitions)?
- What are the organizational implications of solution-oriented vs. process-oriented workplace systems (see below for definitions)?
- How does the implementation process change as the project moves from the pilot stage to widespread implementation? Is it necessary to focus as much attention on design, technology, and planning process in second and third installations to ensure success patterns similar to those achieved in the pilot project?
- What is the nature of organizational learning that occurs as a function of whether the workplace system is process- vs. solution-driven, cost- vs. business-driven, or part of a strategic initiative versus an independent initiative?

Methodology

Research Design

The IWSP organized the research as a series of comparative case studies of variations of non-territorial offices. For the purpose of this study, we defined a non-territorial office as a space allocation policy in which individual employees had no personally assigned desk, office, or workstation over an indefinite time period. We studied variations that included shared-assigned offices, where employees were assigned to a designated workstation at a less than 1:1 ratio; office environments where employees "owned" their *workstations*, but not the *workspace* (i.e., DECsite's Natural Office); and forms of non-territorial offices in which employees sat at unassigned workstations.

Cases were compared within the organizations to examine the nature of organizational learning and how the process evolved over time. The cases were also compared across organizations to examine the nature of similarities and differences as a function of whether the workplace strategy was implemented as either a strategic or independent initiative; motivated primarily by the desire to increase performance as opposed to reduce costs; or was solution vs. process-oriented.

Finally, we examined the innovation process in different countries. Here, the intent was to better understand whether aspects of the process might be different as a function of different national cultural patterns, values and expectations. The sites that were studied by the IWSP were located in the United Kingdom, Finland, Sweden, and Japan. While we did not study sites from other countries in detail, we were able to compare and contrast these sites to similar sites in the United States, Canada, and additional countries based on our own research experience and research conducted by outside organizations.

Defining the Research Design Factors

Strategic vs. Independent Initiatives

Within an organization, data was collected on as many different installations of a given type of workplace innovation as existed within that organization. In some cases, these installations were part of a *strategic initiative*; the various implementations were conceived with respect to a conscious, deliberate management policy. Organizational dependence existed across the implementations, which was reflected in some common reporting channels, as well as employees from the same departments participating in the development and implementation efforts. In other cases, the implementation of the workplace innovation was part of an *independent initiative* conceived and carried out by the management of a specific department, branch, or area office without reference to standard practices in other locations.

Our hypothesis regarding the variations among strategic and independent initiatives centered around organizational learning. We expected that organizations which implemented new workplace strategies as part of a corporate-wide effort would have a higher degree of organizational learning and a refinement of the original concept than occurred when workplace strategies were implemented as an independent initiative. Our assumption was that while the independent projects tended to have a longer, more resource-intensive implementation process, they might also be more innovative and more closely tailored to the needs and work patterns of each group.

Business-Driven vs. Cost-Driven Models

We also examined the way in which new workplace strategies were implemented in terms of whether the primary motivation was cost reduction or business enhancement. Business-driven projects were those whose starting point was an interest in exploring new ways of working that challenged the conventional ideas of where, when, and how work should be done. Cost reduction was typically not a major consideration. Cost-driven models were those whose primary motivation was the desire to reduce costs; that is, without significant pressures to reduce costs, and the expectation that the new strategy would meet this objective, it is unlikely that the new workplace strategy would have been implemented. The cost-driven models at times sought business enhancement as well, but this was often a secondary, less important benefit of the project, while the driving force was cost reduction.

Again, our understanding of the two different models led us to postulate that cost-driven models would tend to favor a strategic initiative, in which standardization was more likely, and that less emphasis would be placed on the planning and design process as the organization expanded its implementation of the workplace strategy from the initial project to more standard practice. We also expected that cost-driven models would tend to generate less innovative solutions than business-driven models.

In the long term (beyond the bounds of this research) we would expect cost-driven models to be less self-sustaining; that is, the office environment would gradually move back towards its original form (i.e., its form before the innovation was implemented) once costs became less of an issue, the numbers of employees declined sufficiently to make sharing space unnecessary, or management control and monitoring weakened. We would expect business-driven models, on the other hand, to be more self-sustaining under the same conditions because the work patterns they supported became valued in their own right by both staff and management.

Solution-Oriented vs. Process-Oriented Implementation

As the research at the different organizations progressed, we also noticed two additional patterns of implementation. Some of the companies began with an idea, built an environment that would support this idea, and then approached the prospective participants with this "solution," hoping to persuade or convince employees that this *particular* environment was the best environment for their work needs (solution-oriented). Strategic initiative projects that followed this particular process often implemented projects across the organization that looked remarkably similar, even though the job types, geographic locations, and possibly business objectives differed for the users.

Other organizations made the decision to adopt *some form* of unassigned office concept, but then involved the direct users in shaping the particular form the solution took (process-oriented). These projects often looked dissimilar, reflecting individual group identities and work needs.

Our hypothesis with regard to these two different implementation processes was that solution-based implementations, in addition to appearing similar, would have a shorter implementation period, would be more standardized, and would be less expensive to install. Process-based implementations, on the other hand, would be more time- and labor-intensive to plan and design, might be more creative in their solutions to challenges associated with non-territorial offices (i.e., communications, connectivity, privacy, technology), and would appear diverse in their overall design.

Table 1 depicts the five primary organizations we examined for this study, as well as several other organizations we referenced. Table 1 also indicates whether each of the organizations used a business- versus cost-based strategy, a process- versus solution-focused strategy, and a strategic versus independent strategy.

Table 1: Research Site Selection

	Business vs. Cost	Process vs. Solution	Strategic vs. Independent
IBM, UK	Cost	Solution	Strategic
Ernst & Young, UK (MCS)	Cost	Solution	Independent
DECsite's Natural Office	Business	Solution	Independent
SOL Headquarters	Business	Process	Strategic
Shimizu	Business	Solution	Independent
(Ernst & Young, U.S.)	Cost	Process	Independent
(Digital Equipment Corp., UK)	Cost	Solution	Strategic
(Chiat/Day, U.S.)	Business	Process	Strategic

Parentheses indicate sites discussed (based on our research and research conducted by other sources) but not studied in depth for the *Implementing Innovative Workplaces* Study.

In some of the cases, the distinctive approaches the organizations took in implementing the non-territorial projects were very clear. For example, the free-address office at Shimizu in Japan focused entirely upon creating a better work environment for its users; the only influence that cost had over the project was to ensure that the new office was not more expensive than the old office to maintain. In other cases the approaches the organizations took were highly distinctive. The DECsite office implementation, for example, was very difficult to identify in terms of whether it was a process-oriented or a solution-oriented approach. The critical factor in this case was that the users basically accepted a solution that was developed before they became involved in the project, rather than the solution occurring as a result of users developing their own concept (this point will be discussed in greater detail in *Part II* of the report). Users, although very active in planning and designing the project, were given parameters on what the environment should look like and the type of work it should support; users did not determine the best way to work and then create the appropriate, requisite environment.

Summary of Research Design

In summary, the research included comparisons of:

a) strategic versus independent initiatives;
b) business versus cost-driven strategies;
c) solution versus process-focused approaches;
d) non-territorial offices in different countries.

Site Selection

Five different companies participated in the study: Digital Equipment Corporation, Sweden; Ernst & Young, UK; IBM, UK; Shimizu Institute of Technology, Japan; and SOL Cleaning Company, Finland (see Table 2: Research Site Description). In the case of IBM, Ernst & Young, and Shimizu, these sites were chosen because in our original "Managing Space Efficiently" study we collected data—including systematic survey data of employees' responses to non-territorial offices—on initial implementations of projects from these organizations. The remaining two organizations were chosen because of the innovative nature of their non-territorial offices; each of the organizations were selected because of features of their non-territorial offices that did not exist in the other organizations.

Table 2 defines, for all five organizations, the nature of the innovation, number of implementations, project duration, and total number of employees involved. (The "+" sign following "Number of implementations" and "Total number of people involved" entries indicates that there have been or will be implementations about which we know, but for which we have not collected data.)

Data Collection Methods

Four data collection methods were used to examine the implementation process at each of the sites: (1) employee surveys to determine satisfaction and effectiveness ratings for the workplace innovation; (2) interviews or focus groups with users and managers; (3) interviews with key facilitators of the system; and (4) archival data involving space allocation and costs. Each of the techniques was used in combination with the other three to help define the new office innovation and the user response to the system.

Table 2: Research Site Descriptions

	Digital Equipment Co.	Ernst & Young, UK	IBM, UK	SOL Cleaning Company	Shimizu Inst. of Technology
Innovation:	Non-Territorial Offices	Shared -Assigned Offices	Non-Territorial Offices	Non-Territorial Offices	Free-Address Offices
Number of implementations:	1	2	7+	17+	3
Project Duration:	1991-Present	1989-Present	1990-Present	1992-Present	1987-1992
Total number of people involved:	16+	394	1000+	150+	88

Cornell Workplace Survey

The Cornell *Workplace Survey* was administered to all employees using the non-territorial offices (see Appendix D: Cornell Workplace Survey). This survey was developed as part of the "Managing Space Efficiently" project and was refined and edited for each subsequent project site. Questions were added to the survey used for ***Innovative Workplaces*** regarding the implementation process and work patterns of end users. Surveys were distributed by the IWSP contact at the site with a cover letter from the company endorsing the study and asking employees to participate. Surveys were returned directly to the IWSP team in Ithaca, New York. No one at the sites had access to the raw data. Participation was voluntary and all respondents remained anonymous.

The survey was divided into four basic sections: background questions, overall workspace ratings, comparative workspace ratings, and alternative workspace ratings. The background section asked users about their age, gender, position, department, previous workspace, current workspace, involvement in the implementation process, and general work patterns. This information was then used to see if there were differences in satisfaction with the new workplace system among respondents in any of the above categories. For example, for each organization, the data was examined across all age groups to determine if there were significant differences in scores according to respondent age.

The overall workspace rating section asked respondents to rate their satisfaction with their current workplace in terms of overall satisfaction, satisfaction with design and technology, training, communication, and implementation process on a scale of 1-5 (1= very dissatisfied, 2= dissatisfied, 3= neutral, 4= satisfied, 5= very satisfied). Users were also asked to rate the importance of these current workspace issues on a scale of 1-5 (1= not important; 5= very important).

The comparative workspace section asked respondents to rate their satisfaction with the components of their new office system compared to their satisfaction with the components of their previous office system on a scale of 1-5 (1= much worse, 2= worse, 3= about the same, 4= better, 5= much better). Issues covered a number of topics, including: work effectiveness, technology, communication, privacy, storage and personalization, and alternative design components (conference rooms, break-out areas, quiet rooms, etc.). Users were asked to rate the importance of these issues as well (1= not important; 5= very important).

The alternative workspace section asked users to rate alternative working areas outside of the office that were established as a result of the new office system. For the majority of sites researched for this study, the alternative workspace typically consisted of the home office. Questions, therefore, were tailored specifically for this environment. Users were asked to rate their satisfaction with such issues as their effectiveness at home, their ability to handle mail and text processing, etc. at home, communication with coworkers from home, and access to technology. Again, this section used a five-point scale (1= much worse, 2= worse, 3= about the same, 4= better, 5= much better). Users were also asked to rate the importance of these issues using the scale described in the previous paragraph.

One additional component in the survey was a free-response section included at the end of the survey. Respondents were asked to identify additional factors that they believed impacted their ability to work effectively, either positively or negatively.

Analysis of the Cornell Workplace Survey

The means, standard deviations, standard errors, and count of each question were tabulated and then examined by the IWSP. Questions were grouped according to issue (i.e., work effectiveness, communication, technology, etc.), and an average score was calculated for each issue.

The means were examined within each site across background data (i.e., department, position, gender, etc.) to determine whether there were significant differences in the means as a function of these factors. Means were also examined across multiple sites (taking into consideration differences in sample sizes) to further examine differences in user satisfaction and work effectiveness.

Because the means were not necessarily indicative of the range and variation in user satisfaction scores (for example, a mean of 3.0 based on 50% of the respondents saying they were "very satisfied" and 50% saying they were "very dissatisfied" is very different from 100% saying they were "neutral"), frequency distributions were calculated and graphed.

The importance ratings were used to help identify what users thought were the most important/least important issues on the survey. This importance rating was very helpful in understanding the office system and the priorities that users placed on different aspects of the office.

A content-analysis was performed on the free responses for each of the organizations to help determine (along with the interview and focus group data) what users felt were the biggest benefits and disadvantages to the new office environment.

Interviews and Focus Groups

A wide range of topics similar to those covered in the survey were explored by means of interviews and focus groups at each of the sites (see Appendix E: Interview and Focus Group Questions). In general, the interviews and focus groups provided deeper insight into the aforementioned issues in the form of anecdotes and personal explanations. Extensive notes and, in several cases, audio recordings were made of the meetings.

All interviews and focus groups, with one exception, were conducted by members of the IWSP research team. The one exception was the Shimizu Institute of Technology, in Japan. Here, interviews were conducted by a member of the group being studied to overcome the language barrier. While not an ideal solution, the data generally reflects the same kinds of responses found in the anonymous surveys (these were mailed directly to the IWSP, where they were translated and analyzed).

Focus groups were organized by the IWSP contact at the site, and typically involved from 5 to 10 people, with a duration of approximately one hour. They were facilitated by an IWSP researcher. Focus groups were designed so that employees at similar levels within the organization were grouped together, in order to reduce the possibility of staff feeling uncomfortable expressing their opinions.

The nature of non-territorial offices, in which staff are often out of the office at unpredictable times, does not always lend itself to scheduled focus groups. Therefore, whenever these could not be organized, individual interviews were used. These were unscheduled interviews, lasting from 30 to 60 minutes, occurring most often in the employee's workstation or some other location within the non-territorial office area.

When face-to-face contact could not be arranged, interviews were conducted over the telephone. Again, the same questions were asked in the telephone interview as in the focus group. The duration of the interviews was anywhere from 20 to 30 minutes.

Archival Data

Archival data at each of the sites took the form of floor plans, cost data (when available), previous studies conducted in the department (either by internal employees or outside consultants), articles written about the sites which were on-hand, training materials in some cases, and any other materials of interest that the organizations had stored on the departments.

Table 3 summarizes the data collection techniques employed at each of the organizations.

Table 3: Data Collection

	Total Number Conducted	Total Number of Locations
Cornell Workspace Survey	546	11
Focus Groups	33	10
Interviews	76	13
Personal Observation	—	11

Defining Non-Territorial Offices

Again, for the purpose of this report, non-territorial offices were defined as offices where employees did not have individually assigned desks, workstations, or offices. Employees used whatever space they preferred when they came into the office, and no one person was associated with any particular workspace. In some cases, employees were able to choose their workspace on a first come, first served basis; in other cases, organizations allowed employees to reserve spaces before they arrived. This latter approach has come to be called "hoteling" because, in its more sophisticated forms, it involves using a computerized reservation system to reserve space ahead of time in the non-territorial offices, much like a person reserves a room at a hotel.

In a non-territorial office, the users usually outnumber the workstations provided. This is based on the premise that employees are out of the office the majority of the time, on average requiring office space only 30% of the time.

Non-territorial offices can take many forms, from completely open desks, to open-plan standard workstations surrounded by panels, to fully enclosed private offices. What distinguishes the non-territorial office is not its physical form, but that it is not assigned on a long-term basis to any specific individual(s).

The variations of non-territorial offices examined in this study included:

1) Non-territorial offices where users were not assigned to any particular workstation or work area (IBM, UK; SOL Cleaning Company, Finland).

2) Non-territorial offices where employees "owned" their workstations, but did not own the workspace (The Natural Office at DECsite in Sweden).

3) Free-address offices, which were essentially the same as non-territorial offices, except that the number of workstations exceeded the number of employees working in the environment (Shimizu Institute of Technology in Japan).

4) Shared-assigned offices, where several users were assigned to a specific workstation, while also having access to unassigned areas such as common rooms, conference rooms, quiet areas, break areas, etc. (Ernst & Young, UK).

The Organization of the Implementing Innovative Workplaces Report

The study is comprised of two parts. *Part I: Comparison of Workplace Strategies* examines the differences between cost- versus business-driven, solution- versus process-driven, and strategic versus independent initiative approaches across companies. *Part II: Findings for Individual Organizations* describes in detail the findings from each organization. For each company and site studied, there are sections on:

- a brief description of the innovation occurring at the organization;
- a summary of the implementation process across time for all of the sites examined;
- an analysis of user satisfaction and work effectiveness using the combined data collection techniques;
- a comparison of the implementation processes across all of the sites and the subsequent changes in employee satisfaction and work effectiveness;
- "lessons learned" and conclusion sections discussing the research findings.

Part I:
Comparison of Workplace Strategies

Comparison of Workplace Strategies

A primary goal of this study was to examine the range of non-territorial office implementations across all of the organizations and compare the projects according to the various workplace implementation strategies employed for each of the projects. We examined each of the implementations and compared the "success" of the projects according to whether strategic- or independent-initiative, cost- or business-driven, and solution- or process-oriented strategies were applied. The "success" of the projects was measured across a number of factors, including:

- user satisfaction;
- work effectiveness;
- duration (lifetime) of the project;
- acceptance of the project;
- cost (in terms of time and resources) to implement the project.

The following sections discuss our findings for each of these factors, as well as such other factors as the innovativeness of the project and organizational learning.

The Implementation Process Model

Although the organizations used different strategies for implementing their new ways of working, major consistencies existed in the implementation processes across all of the organizations and sites. The five major components of the implementation process identified were:

- Meet organizational challenges. Organizational challenges can be anything from finding a more effective and competitive way of working to attracting and retaining valuable staff, meeting transportation regulations, reducing overall real estate costs, etc.

- Reassess how/where work is being done. In meeting the organizational challenges, companies may have to reassess how they are conducting their business. For example, are they not able at present to attract and retain staff because they have certain business practices that make working for the organization seem unattractive to certain populations of workers?

- Conduct fundamental change in business practices. In order to remain competitive, many organizations today are having to change the way they do their work. Changes must be made that sometimes affect the culture of the organization, its structure, management philosophies and practices, and work behaviors and work processes.

- Develop alternative workplace strategies. In order to meet the organizational challenges, many organizations are developing alternative workplace strategies, such as allowing employees who otherwise might leave the company (or never work for the company) to work at home part- or full-time in order to balance work and family needs. Imbedded in this stage of the process are changes in space and technology to support new ways of working. For example, if an organization decides that all of its sales people should be working in a mobile fashion, the organization will need to purchase the technology that will allow the employees to work in this manner. The work in the office will thus also change (independent work is conducted out of the office, while mostly team activities occur in the office), which may require changes in the environment (replace individual workspaces with team settings).

- Managing the change within the organization. New ways of working usually represent a substantial change in how the business was operating before the implementation. This change has to be "managed" in such a way as to make the transition as smooth as possible for the users. Organizations must provide training and education to the users to help them understand the new way of working, the benefits they will achieve as a result of the new practice, and how to work within the new system.

All of the new ways of working that we examined for this study began the implementation process by trying to meet certain organizational challenges (see Figure 1: Phases of the Implementation Process Model). These challenges ranged from cost-based challenges (reducing overall real estate, cutting costs associated with space, etc.) to developing a more effective way of working, to creating a better quality working environment.

The organizations, using different implementation strategies, followed distinct patterns through the implementation model. For example, cost-based strategies tended to exclude the work reassessment and business change phases of the process, focusing the majority of their resources on developing the alternative workplace strategy and the associated space and technology configurations. Business-oriented strategies, on the other hand, placed much more emphasis on the work reassessment and business change phases of the process.

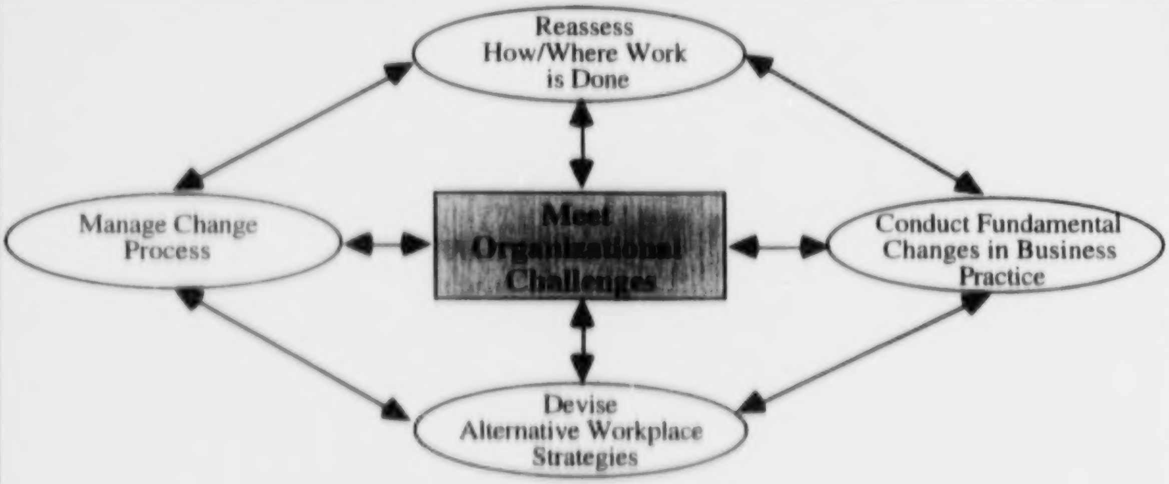
Reassess How/Where Work is Done
Manage Change Process
Meet Organizational Challenges
Conduct Fundamental Changes in Business Practice
Devise Alternative Workplace Strategies

Figure 1: Phases of the Implementation Process Model

The above model shows the individual stages of the implementation process and their relationship to each other. The arrows between the different stages indicate that the process is iterative; as certain stages of the process are conducted, they may have effects on either previous or later stages in the process. For example, as an organization tries to develop the alternative workplace strategy to meet an organizational challenge such as cost reduction, it may find that it can meet other organizational challenges that it did not foresee at the beginning of the process, such as developing a more effective way of working or attracting and retaining employees.

Table 4 is a review of how we classified each of the implementations according to their approach to the implementation process.

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Table 4: Review of Implementation Process Strategies

	Business vs. Cost	Process vs. Solution	Strategic vs. Independent
IBM, UK	Cost	Solution	Strategic
Ernst & Young, UK (MCS)	Cost	Solution	Independent
DECsite's Natural Office	Business	Solution	Independent
SOL Headquarters	Business	Process	Strategic
Shimizu	Business	Solution	Independent

Business- versus Cost-Driven Strategies

The companies that implemented the non-territorial offices from the business-driven standpoint tended to use a cyclical version of the implementation model (see Figure 2: Business-Driven Implementation Process Model).

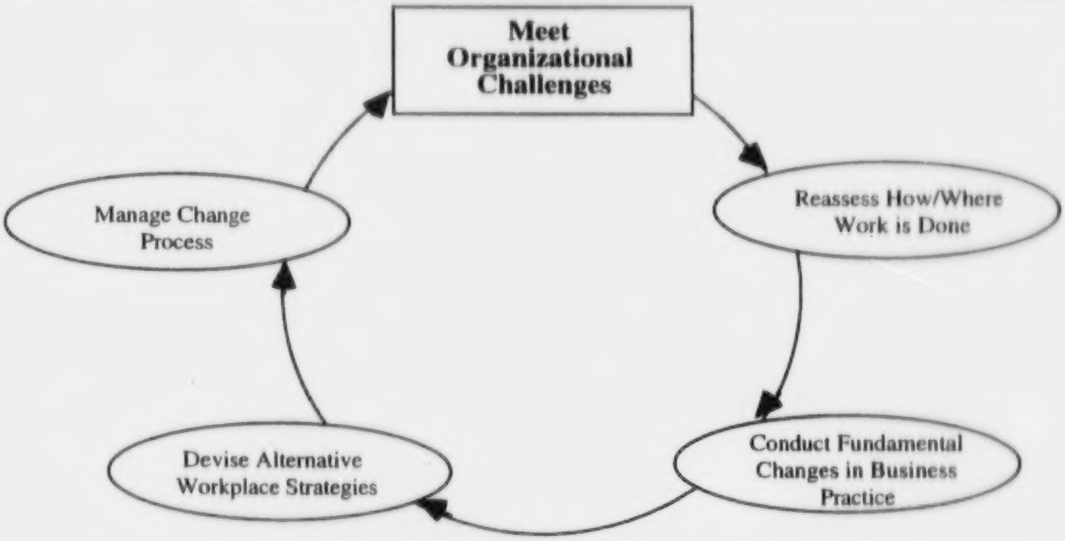
Meet Organizational Challenges
Reassess How/Where Work is Done
Conduct Fundamental Changes in Business Practice
Devise Alternative Workplace Strategies
Manage Change Process

Figure 2: Business-Driven Implementation Process Model

The general pattern was to identify specific organizational challenges to be addressed by the project and then proceeding through each of the process phases until completing the cycle. At this point, the cycle often began again by identifying a different organizational challenge that may have surfaced as a result of the first iteration of the process cycle. For example, the original organizational goal of DECsite's Natural Office centered primarily around improved ergonomics in the office (better furniture, lighting, air conditioning, air quality, etc.) and team collaboration. In the expansion of this concept to the entire floor, the goal of the project focused primarily on giving the employees more choices about where to work; users were provided with quiet rooms, conference rooms, an informal "cafe" seating area, a smoking room, etc.

The key difference between the implementation process model of cost-driven strategies compared to business-driven strategies was the level of emphasis placed on the reassessment of how/where the work is done and the change in business practice stages of the implementation process. The two cost-driven implementations (shared-assigned offices at Ernst & Young MCS and SMART at IBM, UK) tended to focus less attention on these two stages of implementation, particularly with regard to the change in business practices (see Figure 3: Cost-Driven Implementation Process Model).

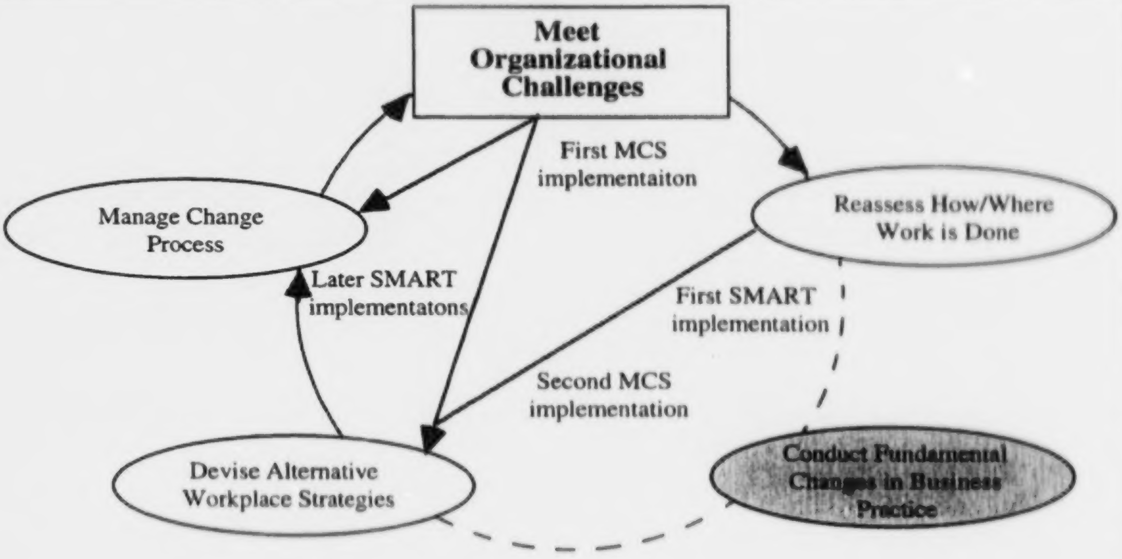
Meet Organizational Challenges
First MCS implementaiton
Reassess How/Where Work is Done
Manage Change Process
Later SMART implementatons
First SMART implementation
Second MCS implementation
Devise Alternative Workplace Strategies
Conduct Fundamental Changes in Business Practice

Figure 3: Cost-Driven Implementation Process Model

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The first implementation of SMART at IBM in the UK, for example, began the process with the intent of reducing overall real estate costs. Different suggestions were made as to how to accomplish this task. Research was then conducted within the UK to determine how employees were working and how they were utilizing space at IBM. From this research, a non-territorial office strategy was developed, and space and technology were altered accordingly.

At no time in the process was the focus ever on changing business practices or managing change; managers continued managing employees in the same manner as before SMART was introduced, work was assigned and monitored in the same fashion, work behaviors in the total system were not addressed, etc. Users were told how the mobile employees were supposed to use the different workstations during brief training sessions, but there was little discussion of how their work patterns should change or how they could plan their days around the system to work more efficiently.

Later SMART implementations eliminated both the work reassessment and business change phases from the implementation process. Planners felt that, because general work patterns in the office had been established in the UK-wide research, this step was unnecessary in the later implementations. To a large extent, the later implementations also eliminated the development of the alternative workplace strategy from the implementation process because the SMART concept had already been developed, including guidelines for space and technology.

The shared-assigned office implementations at Ernst & Young followed somewhat the reverse process to that of the SMART implementations in that the second installation was actually more process-intensive than the first (refer to Figure 3 above). MCS #1 began with the objective of reducing overall facility costs and then went from that stage of the process directly to the shared-assigned strategy. In MCS #2, however, the department—after identifying the organizational challenge—hired consultants to look at how employees were working in their present office, and then developed a strategy that would, in addition to reducing costs, correspond to their work patterns. However, as was the case with IBM, UK, neither of the installations addressed changes in business practice, such as changes in management styles and work behaviors.

Meeting Organizational Challenges

In addition to the variations in the implementation process cycle, key differences existed within each of the *individual* phases of the process depending on whether the strategy was business-oriented or cost-based. One of the most critical differences involved the challenges that the organization was attempting to meet by introducing the new workplace practice. The business-based strategies all focused on business goals (e.g., creating an office that emphasized employee empowerment, a more ergonomic and effective way of working, or a better physical working environment for the users), whereas cost-based strategies centered around reducing real estate costs or reducing space by changing the space allocation policies.

Whether the organizational goals were business- or cost-based directly influenced the nature of the implementation process cycle. Business-based goals in most cases required that the organizations carry out work reassessment studies, as well as introduce major changes in the way the organizations conducted their business. Cost-based goals focused on the project primarily from a real estate point of view, and more often than not neglected these early phases of implementation; the major goal of the projects was to reduce real estate, not to change the way the organization was working. The effects of these two approaches to implementation on the outcomes of the projects will be discussed in the *"Success" of Business- and Cost-Driven Strategies* section on page 26.

Reassessing How/Where Work is Done

Business-driven projects were attempting in most cases to change the way in which employees worked. In order to create a more effective means of working, the organizations had to examine how/where the work was currently being done to find areas for improvement in the overall system. Any changes in the business practices and any new workplace strategies then centered around these targeted "areas of improvement."

Again, cost-based strategies centered around real estate and not improving long-term business performance. We saw no evidence that cost-based approaches attempted to reassess or reexamine work processes and patterns and thus introduce more business practice changes.

Subsequent Changes in Business Practices and Managing Change

The subsequent changes in the business practices for each of the organizations with business-driven workplace strategies as a result of these findings are summarized in Table 5.

Table 5: Summary of Business Practice Changes

	Change in Business Practice
SOL Headquarters	• Elimination of old hierarchy in the organization • Diffusion of skill • Changes in management philosophy and practices • Changes in work behaviors • Restructuring how work was assigned/distributed
DECsite's Natural Office	• Changes in work behaviors • Changes in management philosophy and practices
Shimizu	• Changes in work behaviors

In the case of SOL Cleaning Company, the entire business philosophy was restructured before developing alternative workplace strategies. The new business philosophy centered around the concept of employee empowerment. To give employees more control over their work and to give them a greater sense of responsibility and importance within the organization, all status symbols such as parking spaces, position titles, and secretaries were eliminated. SOL had the advantage of being a new company—albeit one with employees who had been with the same previous organization for many years— and therefore did not have some of the problems that long established organizations encounter in creating such radical changes within their organizations. By eliminating position titles, they essentially diffused skills throughout the organization; an employee who would not have been required to perform what was considered "management's responsibility" at the old organization now had to learn how to perform this task.

SOL's employee empowerment philosophy also gave employees freedom from time and place by allowing them to work whenever and wherever they felt it was necessary. New "managers" had to change the way that they assigned work, as well as how they evaluated performance (e.g., adopting a results-oriented management style).

DECsite also began changing the "culture" of their organization before the alternative workplace strategy was introduced. Each member of the DECsite team was required to complete the Personal Efficiency Program (PEP), which encouraged workers to eradicate inefficient work habits such as unnecessary papers and "tying" themselves to the office.

An important aspect of this stage in the process was the timing of the introduction of business changes to the employees. Both SOL and DECsite introduced many of the changes *before* the actual workplace settings were implemented; they began changing work behaviors and attitudes before the new workplace setting was even designed. By changing the work behaviors before the employees began working in the new setting, many of the concerns and "teething pains" were handled before the settings were altered, thus making the transition to the new system fairly smooth and "logical;" employees could understand why they should (and would) be working in a new way and the advantages the system would offer them.

Development of Alternative Workplace Settings

The primary difference between the cost- and business-driven strategies was not necessarily the actual setting that was developed, but the principles around which the strategy was developed. Each of the three organizations using the business-driven strategies for implementing workplace innovations developed workplace strategies that would help support the changes in their business practices. In order to accomplish this task, the organizations needed to provide its employees with the proper workplace strategies—including the space, technology, and management practices—to support the new way of working.

Cost-based projects, on the other hand, were designed less around the concept of creating a more effective workplace, and more around reducing the cost associated with office space. Instead of the question being "Does this strategy represent the most effective environment for the employees?" (as was the case for business-driven strategies), the question became, "If this workplace strategy were to be introduced, would employees still be able to work without significant reductions in their effectiveness?"

Managing the Change Process

The way in which the changes in the organization were introduced, employees were guided through the transition stage, and the new ways of working were reinforced for business-driven strategies was a more continuous process, beginning before the innovation was introduced and lasting after the employees began working in the new fashion. Compared to cost-driven strategies, employees in business-oriented projects often were trained in working in the new system, and were encouraged throughout the transition from the previous state to the desired state of working. Cost-driven strategies, on the other hand, did not manage the change as aggressively, and many of the desired changes in work behaviors did not occur. In several instances, employees rejected the new way of working entirely.

The "Success" of Business- and Cost-Driven Strategies

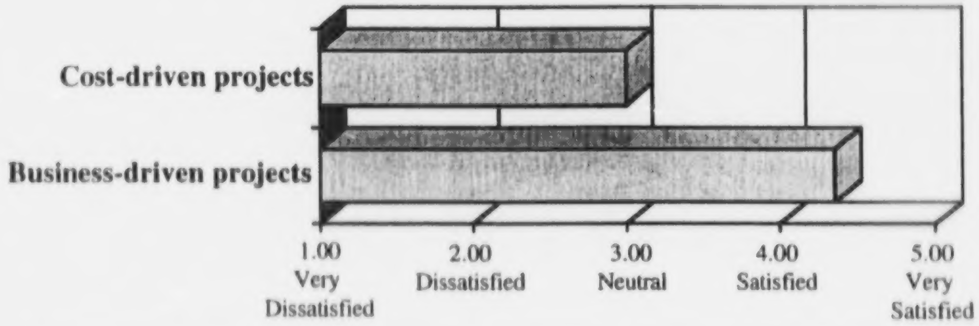
As mentioned earlier in the report, the measures of "success" or "failure" of a project were user satisfaction and work effectiveness in the new office system, the duration of the project, and the acceptance of the innovation throughout the organization. We also compared the cost of the different projects in terms of time and resources, and looked at the extent of workplace innovation across the different implementation process strategies.

Business- vs. Cost-Driven Projects

The user ratings for satisfaction with the overall new office system for the three business-driven firms (SOL, DECsite, and Shimizu) and the two cost-driven firms (IBM, UK and Ernst & Young, UK) were averaged across all of the survey respondents. A total of thirteen sites at the five firms were studied in detail.

The mean satisfaction rating for the business-driven projects was significantly higher ($t= 9.904$, $df= 534$, $p<0.0001$) than the mean satisfaction rating for cost-driven projects (see Figure 4: Overall Satisfaction with Business versus Cost-Driven Innovations). The mean for business-driven projects was almost 4.5 on a scale of 5.0 (where the higher number represents higher satisfaction), denoting that the majority of respondents rated their satisfaction with the office system as satisfied/very satisfied. The cost-driven projects, on the other hand, had a mean score of 3.0, indicating that the average satisfaction with the new office system was "neutral."

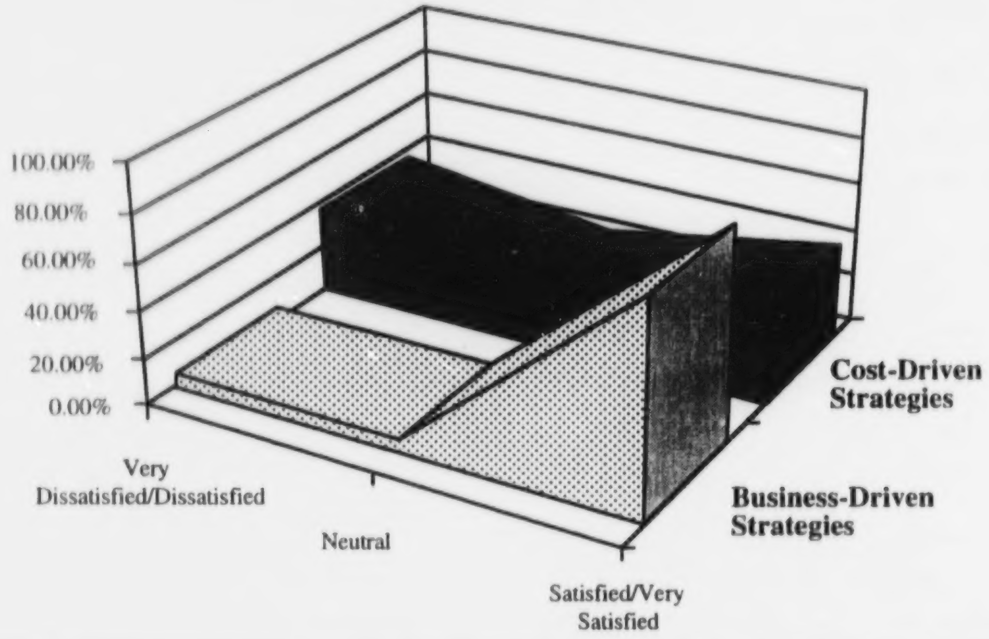
Figure 4: Overall Satisfaction with Business- versus Cost-Driven Innovations



The frequency distributions for the mean satisfaction scores showed that for business-driven projects 88% of the respondents rated themselves as "satisfied" or "very satisfied." Very few survey respondents rated their satisfaction with the overall office system as neutral or below (11.2%). In contrast, the frequency distribution for cost-driven projects indicated that the survey respondents rated their satisfaction with these projects almost equally on either end of the scale; approximately 37% of the respondents were "dissatisfied" or "very dissatisfied" with the new office system, while 40% of respondents were "satisfied" or "very satisfied" with the office system. The remaining respondents stated that they did not feel strongly about the office system either way.

The difference in satisfaction scores for these two strategies centered around the emphasis of each approach. In the business-driven projects, the emphasis was primarily on the user: how to create an environment that supported diverse work patterns and styles, was more efficient, more flexible for the user, and more stimulating and pleasant. In the cost-driven projects, the emphasis was primarily on reducing costs by reducing space requirements for the users. Users will necessarily benefit from business-driven projects, while they might not *necessarily* derive benefits from the innovation in cost-driven projects.

Figure 5: Frequency Distribution for Satisfaction Ratings for Business- vs. Cost-Driven Strategies



It is imperative to point out that a mean score of 3.0 and a frequency distribution where almost 60% of the users were either satisfied with the system or were unaffected, as was the case with the cost-driven firms, is not necessarily unfavorable. For example, if the organization were to save substantial amounts of money in using this implementation approach by reducing costs associated with real estate, a less expensive implementation process, a less time-consuming implementation process, etc., it may be worth examining whether or not to use this type of approach. With this type of approach, however, our data indicates that a significant number of people will be dissatisfied with the office system. This large contingent of dissatisfied users can create a substantial resistance to the new office system. Eventually, the organization will have to deal with these users through improvements to the system, investments in space and technology, a new office system, etc., which could undermine any original savings (see *Cost of Different Projects* section for more details). In addition, using this type of approach does not address future needs or concerns. It does not look at how employees *should/could* be working in the future, but rather at how they can work today to give the organization what could be only temporary cost savings.

In user satisfaction with work effectiveness and other issues related to the office system (home, technology, alternative design, storage/personalization, privacy, and communication issues), the means of the business-driven projects were significantly higher than the means for the cost-driven projects, with the exceptions of technology and home issues (see Figure 6: Business- vs. Cost-Driven Innovations: Satisfaction with the Project). As Figure 6 illustrates, survey respondents in the business-driven projects rated their satisfaction with the above issues in the new office system with averages over 3.0, while survey respondents rated their satisfaction

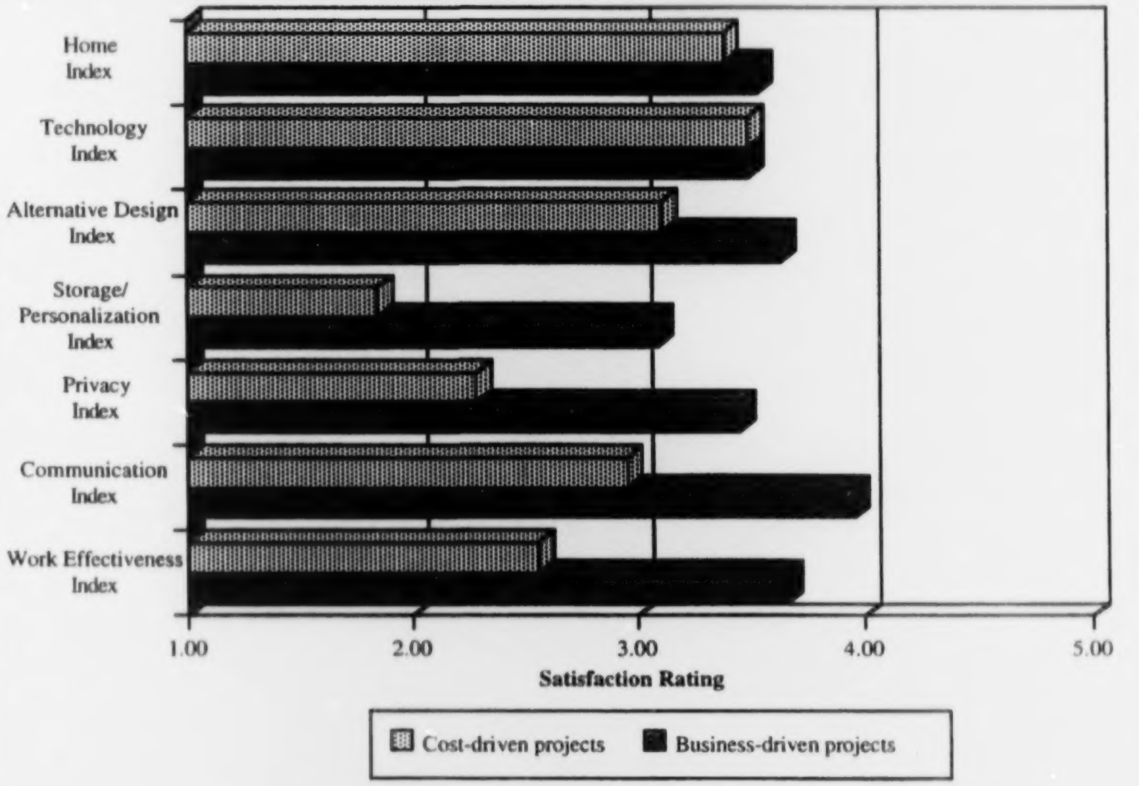


Figure 6: Business- versus Cost-Driven Innovations: Satisfaction with the Project

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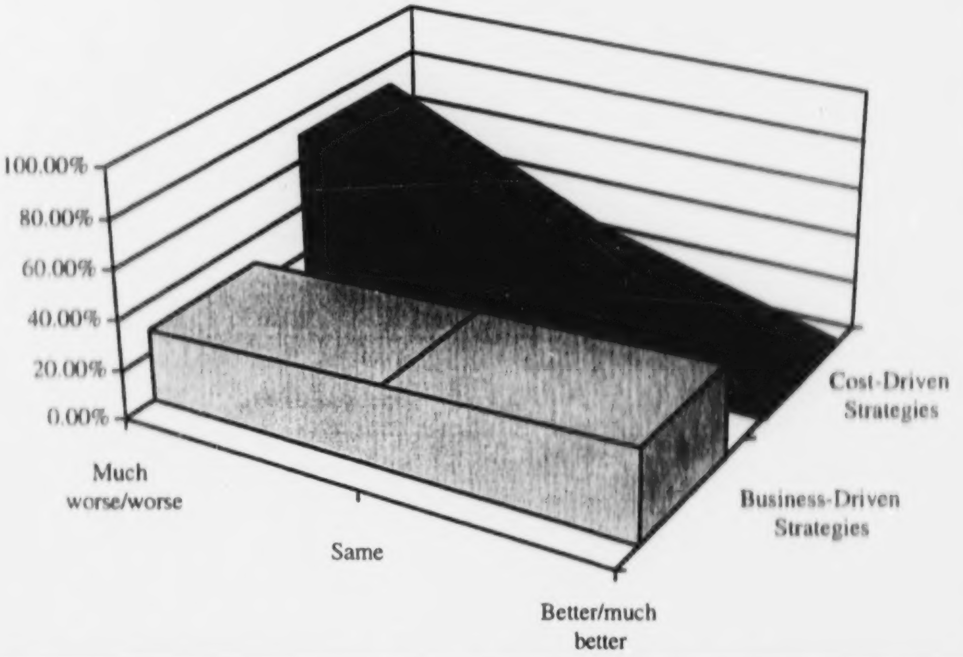
generally under 3.0 for cost-driven projects.

Again, these differences in satisfaction scores centered around the emphasis of business-driven projects on the user. With cost as a secondary issue, project planners may be more willing to reinvest savings from using space more efficiently to ensure that users have the appropriate space, technology, and training to work in the new office systems. It is difficult for planners to provide the same sort of attention to these factors in a cost-driven project.

User satisfaction with regards to privacy issues in the new office system is a prime example of the different resources devoted to users of business-driven projects. Referring to Figure 7: Frequency Distributions for Privacy Issues, user satisfaction for privacy was rated fairly low by users of cost-driven innovations. Less than 3% of all respondents rated these issues as better/much better. Thirty-seven percent of the users of business-driven projects, however, rated these issues as better/much better.

In projects that were business-oriented, users were most often supplied with alternative work spaces or special function rooms such as confer-

Figure 7: Frequency Distributions for Privacy Issues



ence rooms, quiet rooms, team offices, etc. Again, the goal behind these projects was business-oriented; the company was not as worried about its expenditures on the project as much as it was concerned about creating a better, more competitive organization. The provision of such rooms, which was not always possible when the driving force was cost reduction, allowed users to work in a variety of settings depending on the task and the degree of privacy necessary to complete their work. While it may have been more costly for the organization to provide such spaces, the spaces enabled the organization to use more effectively a much more expensive and valuable resource—its people.

Duration of the Projects and the Acceptance of the Innovation Throughout the Organization

The duration of the different workplace innovations appeared to be directly related to the implementation process, particularly with regard to the inclusion of reassessment of how/where work is done and the changes in business practice stages. Shimizu is a prime example of this theory. The first implementation of free-address offices at Shimizu essentially completed the implementation process cycle described for the business-driven strategy (see page 20, Figure 2). In the later two installations, Shimizu omitted the earlier stages in the implementation process and went from identifying organizational challenges to implementing the space and technology necessary to operate a free-address office. These later two implementations, without the emphasis on user needs, work patterns, and training, were rejected by the departments shortly after being implemented (i.e., the free-address offices no longer exist).

The IBM SMART projects suggested a similar experience. As the SMART concept was implemented in locations throughout the UK, the implementation process became more abbreviated. None of the projects addressed changes in the business practice, and later implementations did not emphasize reassessment of how/where work was being done, nor even the development of alternative workplace strategies for the individual sites. Many of the SMART sites, upon the reduction of employees in IBM, quickly reverted to their old way of working. For example, Glasgow, one of the first implementations of SMART, returned to its original office system, where employees had individually assigned workstations, less than a year after SMART was implemented. The project was designed to support 62 users, but shortly after implementing SMART, the number of users was reduced. Instead of utilizing the available space for alternative work settings such as team spaces or quiet rooms, the group reverted to its old office system.

Bedfont Lakes and Warwick II experienced a similar phenomenon. One year after SMART was introduced at Bedfont, and only several months after the concept was introduced at Warwick II, there was evidence that people were beginning to go back to the previous office system. Many employees had personalized SMART desks and offices and had taken over previously unoccupied storage facilities.

DECsite and SOL, on the other hand, had quite the reverse occur with their office innovations. The Natural Office was not only still in existence at DECsite two years after the concept was introduced, but had spread to other areas of the building. Executives in the building had converted their offices to a non-territorial office with adjustable furniture, as had an entire floor of over 200 people. SOL not only implemented its office system in the headquarters, but also in sixteen of its smaller "studio" locations. Both of these office innovations included all phases of the implementation process model described earlier in this report.

The reason that these two projects had longer lifetimes and acceptance appeared to stem from the long-term benefits of the projects and the incentive for departments to implement them. While cost savings associated with a reduction in office space may appeal to many in the short run, many managers see facility costs as a "necessary evil," and are not willing to restructure the way that they and their employees work as a result of such projects. Increases in worker productivity, however, are long-term paybacks that provide managers with a greater incentive for adopting new ideas. While many of the ideas that we have examined did have an associated cost savings, this savings represented an additional benefit of implementing the office innovations, not the primary gain.

The duration of the project also appeared to be related to the degree of education and training at each of the sites. In the business-driven projects, training and education were provided which emphasized how to actually work in the new office system: how to reduce storage requirements, how to manage by results, how to work flexibly in the new environment. For example, DECsite managers went to great lengths to help users adapt to the new way of working. While the PEP program encouraged employees to consider where they did their work, why they did it in a particular location, and assessed whether that was the best location for performing work, these behaviors were cultivated *after* the flexible office was installed. Some employees had a more difficult time making the changes in their work behaviors. These employees were helped to change not only by talking to them about the changes before the Natural Office was implemented, but also by ensuring that they practiced these changes in work behaviors while in the new office. This nurturing of employees in the new workplace system had a strong influence on the overall success of the Natural Office and on employee satisfaction.

In the cost-driven projects, training—if any—was brief and centered on technology rather than on work behaviors. In the cases where training in the new way of working and encouragement to change work behaviors were not provided on a continuing basis, the tendency was for users to revert to their old working behaviors, perhaps without even the conscious knowledge that they were doing so.

An explanation for why the lifetime of projects that specifically address training and educating people about the new workplace system was greater than those that did not is the concept of "give and get." Users are taught how to take advantage of all the benefits that the system has to offer; they can see what they are "getting" as a result of their personal space being taken away. If users are never in a position to recognize the benefits of the system, they only see that their space is being given away, without them getting anything in return.

Cost of the Different Projects

Our assumption had been that the business-oriented projects would be more expensive to implement than the cost-oriented projects because of the more elaborated implementation process and the overall design of the workplace (which often includes much more variety in terms of work settings and a non-corporate feel). Although it was very difficult to obtain detailed cost information from the different sites, the data indicates that our assumption was fairly inaccurate. To summarize some of the cost information for business strategies:

- At DECsite, the Natural Office resulted in a reduction in office space from 4,650 sq. ft. to 2,150 sq. ft.—a move from approximately 388 sq. ft. per person to 135 sq. ft. per person. In later implementations (i.e., the spread of the concept to the entire DECsite floor), the space reduction per person was from 330 sq. ft. per person to 160 sq. ft. per person. The office cost 635,000 SEK (approximately $85,000 U.S.): 335,000 SEK ($43,580 U.S.) for the furniture, 300,000 SEK ($41,420 U.S.) for the raised floor, linoleum, walls and other refurbishment.[3] The management at DECsite estimates that this fit-out cost was higher than it would have been for a traditional Digital office. However, the more than 50% reduction in space requirements and the estimated 20% increase in productivity, even with the onetime cost of fit-out and new, special purpose work areas, constituted a very significant annual savings.

- The office area at SOL was approximately 6,500 sq. ft. Although exact figures were not available, management estimated that the office cost 30% of what it would have cost to implement a traditional office. One reason for this is because it cost very little to build. Employees volunteered their time to help design the office in the five-week time period in which it was implemented. Also the informal furniture was residential quality rather than commercial, which is less expensive. Some of the art and animals located throughout the office were donated to the company as well.

To summarize some of the cost savings for cost-driven projects:

- At IBM, the creation of the Bedfont Lakes facility enabled IBM to close three of its previous buildings (Brentford, Richmond, and Chiswick) and house the users at a single site. Without SMART or some other form of alternative office environment, this consolidation would not have been possible; 1,000 users were able to occupy a building that under traditional office space allocation would have housed only 600.[4]

- The second implementation of shared offices at Ernst & Young, housing almost 300 people, represented a reduction in office space of 8,600 sq. ft., and an overall cost savings of $1.7 million in lease payments.

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[3] Interview with DECsite management, October 1993.

[4] (1992). £100 Million joint venture bears fruit. Corporate Members News. London, England.

As this data clearly demonstrates, the projects, whether they were business- or cost-driven, experienced a significant reduction in office space and square feet per person.

We also assumed that the business-driven projects would have a longer implementation time. In some cases (e.g., Shimizu), this assumption held true. Both DECsite and SOL, however, had relatively short implementation times compared to the other projects (see *Part II* for more details).

The primary difference in business- vs. cost-driven strategies becomes more evident when examining the initial outlay that organizations made to implement the projects. As was the case with DECsite and Shimizu, business projects appeared to have a higher first cost compared to cost-driven projects. This is difficult to confirm because we were not able to obtain total costs for all projects, but managers from both DECsite and Shimizu stated that they felt these offices were more expensive. In the long run, however, it is very possible that the ongoing costs for business projects was lower than for cost projects. For example, IBM and Ernst & Young had to go back to their original implementations and make changes to the system (i.e., improve the telephone system, improve the technology, add more visitor terminals, change the design concept, etc.), whereas in the business-driven cases the initial implementation worked well from the start. The cost-driven approaches, therefore, appeared to shift the costs from the initial outlay to the ongoing operation of the project.

This same concept can be found in manufacturing in the form of "zero defects vs. warranty cost." Many organizations have realized that it makes more sense to get quality right up front than to pay for it over time in much higher warranty costs and loss of consumer confidence—and ultimately, sales. By paying more initially, organizations with business-driven strategies often end up with higher quality workplaces with lower ongoing costs.

Innovativeness of the Projects

Business-driven projects tended to be more innovative than cost-driven projects; that is, they provided a wider range of places to work within the office, and often had a less corporate, more residential "feel" to them. Even Shimizu's free-address offices, which, according to Western standards, were very conventional, were unique according to Japanese standards.

There were several plausible, related explanations for the difference in the degree of innovation between business-driven and cost-driven initiatives. One was that, in business-driven projects, a larger proportion of the costs saved by reducing space per person were *reinvested* into other functional work areas (e.g., dedicated project rooms, informal meeting areas) that would not have been cost-justifiable under the conventional individually-assigned space standards.

A second factor was the focus in business-driven initiatives on understanding the nature of the work processes themselves, including subtle variations between situations that might on the surface appear identical. For example, in cost-driven initiatives one field sales group was likely to be viewed much like another, even though they served different sized organizations or types of clients, in different-sized areas, with different kinds of transportation infrastructure. In business-driven approaches these kinds of subtle differences were more likely to be probed and understood, and the setting to reflect them. The focus on business process reengineering in the business-driven approaches also made it easier to conceive of the new workplace strategy as more of a blank canvas, rather than as a component of an existing workplace system that was to be modified (albeit, sometimes significantly) in order to reduce costs.

Related to both of the above factors was that all of the business-driven cases we studied had a very strong high-level champion who was personally committed to and enthusiastic about change. These champions wanted to transform their working environments, physically, socially, and technologically. As important, they themselves worked in the new environments, living both with the changes in the systems and with the reactions of their peers and subordinates. In the cost-driven approaches, while there were strong advocates of the new way of working, they were less often the persons who had initiated the change process, and less often worked in the settings they had changed. They did not "live" on a daily basis with those working in the setting. Typically, these advocates were assigned the job of implementing the new workplace solution; it was their job. The importance of champions in developing and implementing innovative, business-driven solutions cannot be overemphasized.

Business Summary for Business- versus Cost-Driven Strategies

The following two tables highlight some of the major differences between cost- and business-driven projects. Both types of strategies offer benefits to the organizations, but the business-driven strategies tend to outperform the cost-driven strategies.

Table 6: Summary of the Implementation Process for Business- and Cost-Driven Strategies

	Business-Based Strategies	**Cost-Based Strategies**
Meet organizational challenges	• Focused on business-oriented challenges that significantly impacted how the organization conducted business	• Focused on reducing real-estate or reducing space by altering space allocation policies
Reassess how/where work is done	• Focused more on re-engineering the workplace	• Often eliminated this phase of the implementation process
Conduct fundamental changes in business practice	• Centered around the findings of the work reassessment phase • Often resulted in significant changes in management philosophy, work behaviors and attitudes, culture	• Often eliminated this phase of the implementation process
Develop alternative workplace strategies	• Were the result of earlier phases • Were developed to help support changes in business practice • "Does this strategy represent the most effective environment?"	• Centered around cost rather than business issues • "Would employees still be able to work in this environment without significant reductions in effectiveness?"
Change management to support organizational change	• Was a continuous process of helping the users make the transition from present state to desired state	• Often eliminated from the process

Table 7: Summary of the "Success" of Business- and Cost-Driven Strategies

	Results	Explanations
User satisfaction and work effectiveness	• Business-driven projects had significantly higher user satisfaction ratings for the majority of issues compared to cost-driven projects	• Business-driven projects focused on user needs • Cost-driven projects focused on saving money/cutting costs
Duration and acceptance of the innovation	• Projects emphasizing work reassessment and business change had longer duration and greater acceptance • Projects with more training, education, and "nurturing" had longer duration and greater acceptance	• Long-term benefits to overall business compared to savings • Greater incentive to accept/implement change
Cost of the innovation	• Business projects tend to have a higher initial outlay, lower ongoing costs, while cost projects tend to have lower initial outlay, higher ongoing costs	• Business projects often have multiple settings which are more expensive to design than more traditional settings • Cost projects often have to "revisit" project to make changes
Innovativeness of the project	• Business-driven projects more innovative: provide wider range of places to work, have non-corporate, more residential "feel"	• Often more costly to design these aspects into the system, therefore cost-restricted, projects would not necessarily include them

Process- versus Solution-Oriented Strategies

Of the five organizations studied for this report, four had a solution-oriented approach to the implementation process, while only one had a process-oriented approach. Table 8 reviews how we classified organizations according to this strategy:

Table 8: Review of Process- vs. Solution-Oriented Approaches

	Process vs. Solution
IBM, UK	Solution
Ernst & Young, UK (MCS)	Solution
DECsite's Natural Office	Solution
SOL Headquarters	Process
Shimizu	Solution

For some of the projects, the differentiation between whether the company had a solution- or a process-oriented implementation process was only very slight, while for others the differentiation was very clear. Essentially, *solution-oriented* strategies are ones in which a basic workplace solution is repeated in multiple sites, with minor modifications. *Process-oriented strategies,* in contrast, standardize the principles guiding implementations at different sites, and the process for identifying what the most appropriate solution is. The workplace solution itself is likely to vary considerably, however, from one site to another.

For example, the IBM SMART project was a solution-oriented project; the first non-territorial office solution implemented became the basic model for all subsequent implementations at different sites. While changes were made in the nature of technology and in some aspects of the workstation design, each site started from the same model and was recognizable as a refinement of it.

In process-oriented approaches, such as the one at SOL, the specific workplace solution at each site was different. What was common was the commitment to the principles of the three freedoms: freedom from time, freedom from space, and freedom from status (see SOL case study, *Part II*).

To be part of a solution-oriented process does not imply that the end users have no involvement in the planning and design process. At DECsite, for example, interviews with the small workplace planning committee indicated that the manager of the group knew from the onset of the project the type of solution he wanted. Each step in the process was geared towards working in a non-territorial, flexible environment, including the PEP program. The alternative workplace strategy phase took on the nature of a refinement process—who would make the furniture, what rules/policies should be developed for office use, etc. The alternative workplace strategy and the earlier components of the model interacted throughout the process. However, the final workplace solution was essentially in place before the end users became directly involved.

Thus solution-oriented projects standardized the *solution* and then set up guidelines for how the new environments should look and the policies that governed the use of the office. For the process-oriented projects, the *process* by which the planners developed the new workplace strategy became standardized.

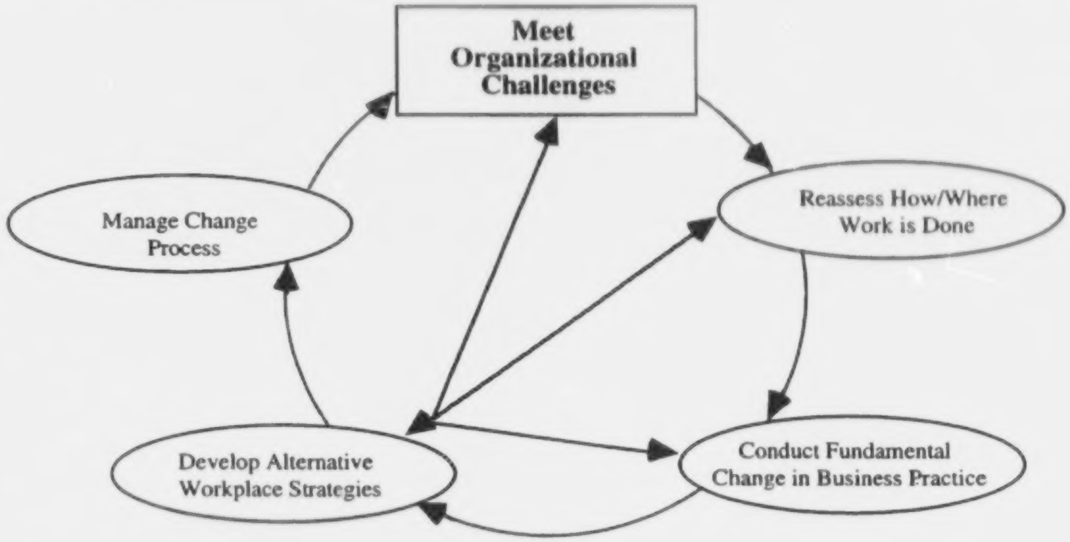

Meet Organizational Challenges
Reassess How/Where Work is Done
Conduct Fundamental Change in Business Practice
Develop Alternative Workplace Strategies
Manage Change Process

Figure 8: Solution-Oriented Implementation Process Model

In some cases of which we are aware, but which we have not studied formally, there has been a shift from a solution-oriented (and often cost-driven) model to one that is more process-oriented (and more business-driven). A key indicator is simply whether or not different sites' workplace solutions closely resemble each other or not. Ernst and Young's offices in Chicago, New York, and (soon) in Dallas, for example, differ significantly in the nature and variety of the work areas provided to professional staff. The same is true of Chiat/Day, a Los Angeles-based advertising agency. In both cases, the underlying principles were shared, but there was no attempt to create a single solution that could be "rubber-stamped' across different sites.

Figure 8 shows that solution-oriented approaches omitted or minimized two critical stages that were a focal point in process-oriented strategies; namely, reassessing how and where work is done, and reengineering the business processes themselves based on that analysis. Process-oriented approaches required involving staff at each site, and in each work group, in the process of planning and designing a workplace solution that worked for their specific needs. The value of a process- vs. solutions-oriented approach is described below.

The "Success" of Process- and Solution-Oriented Strategies

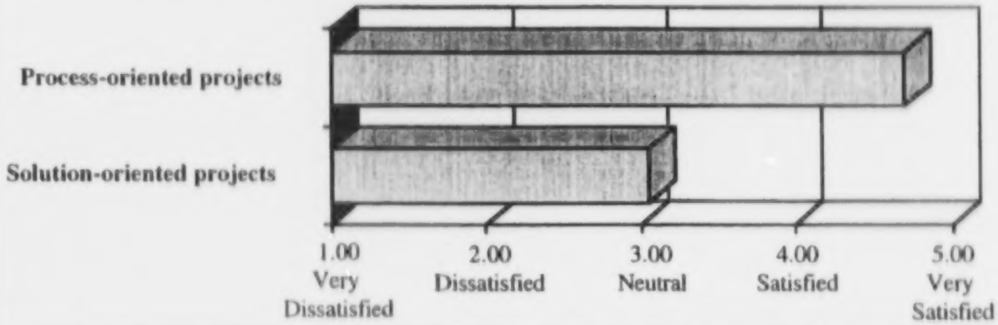
Again, the measures of "success" or "failure" of a project that we used were user satisfaction and work effectiveness in the new office system, the duration of the project, and the acceptance of the innovation throughout the organization. We also compared the cost of the different projects in terms of time and resources, as well as looked at the innovativeness across the different implementation process strategies.

User Satisfaction and Work Effectiveness for Process- vs. Solution-Oriented Projects

The user satisfaction ratings for the overall new office system for the process-oriented innovation (SOL) and the solution-oriented innovations (IBM, UK; Ernst & Young, UK; DECsite; and Shimizu) were averaged across all of the survey respondents. Because we examined only one process-oriented strategy, our findings should be viewed with some caution. From our experience with these sites and other sites not explicitly examined for this study, however, we feel fairly confident of our results and conclusions with regard to these approaches.

The mean satisfaction score for the process-oriented project was significantly higher ($t= -9.469$, $df= 534$, $p<0.0001$) than that of the solution-oriented projects (see Figure 9: Overall Satisfaction with Process- versus Solution-Oriented Innovations). The mean score for the process-oriented project was over 4.5 on a scale of 5.0, indicating that the majority of survey respondents rated their satisfaction with the new office system higher than their satisfaction with the previous office system. The solution-oriented projects had a mean score of just slightly over 3.0, indicating that their satisfaction was about the same as with the previous office system.

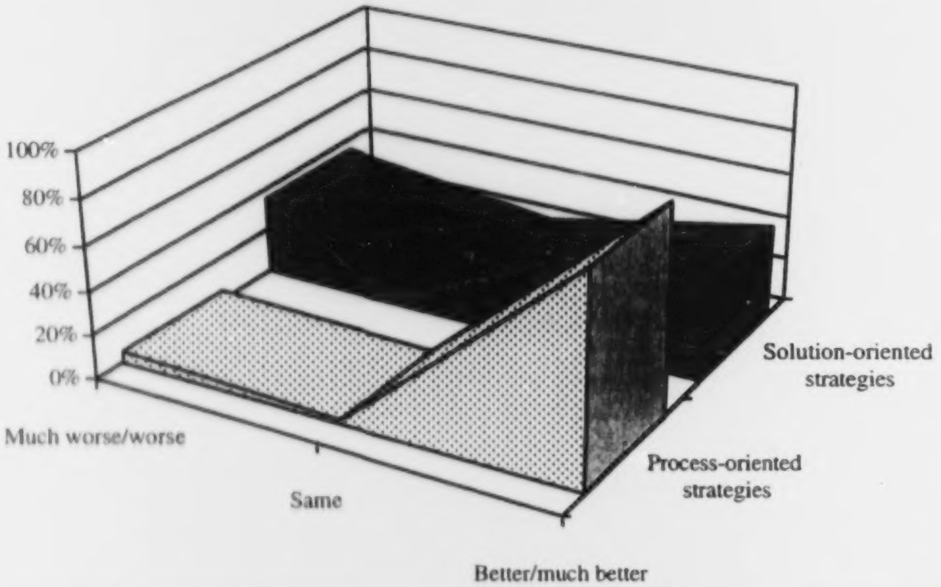
Figure 9: Overall Satisfaction with Process- versus Solution-Oriented Innovations



The frequency distribution for the mean scores indicates that for solution-oriented projects, the survey responses were distributed fairly evenly across the satisfaction scale (see Figure 10: Frequency Distribution for Satisfaction Ratings for Process- vs. Solution-Oriented Strategies). Thirty-five percent of all survey respondents rated their satisfaction with the new office system as much worse/worse than the previous office system, while 42% rated the new office as better/much better, with the remaining respondents rating their satisfaction as neutral. For process-oriented projects, however, the satisfaction ratings were consistently on the upper end of the scale, with 93% of all users rating their satisfaction with the new office system as better/much better.

The user satisfaction with regards to work effectiveness and other issues (home, technology, communication, space/design, storage/personalization, and privacy) were also significantly higher for the process-oriented projects than they were for the solution-oriented, with the exceptions of technology and home issues (see Figure 11: Solution- vs. Process-Oriented Innovations: Satisfaction with the Project). Again, this goes back to the focus of the project being on the end users, with their particular needs being addressed.

Figure 10: Frequency Distribution for Satisfaction Ratings for Process- vs. Solution-Oriented Strategies



Similar to the business vs. cost strategies, the differences in the means can be partially attributed to the fact that the process-oriented strategies were more end user focused, particularly in later installations of the innovation. At no time was the alternative workplace solution detached from the users; the solution was developed with the particular set of users in mind, taking into consideration their individual work patterns, needs, and personalities, rather than imposing a solution that was originally developed with a different set of users in mind and then tailored in minor ways for the particular work group.

Duration of the Projects and the Acceptance of the Innovation Throughout the Organization

The duration and acceptance of the process-oriented projects appeared to be greater than that of solution-oriented projects, particularly with regard to acceptance throughout the organization. Again, this is a case where multiple implementations demonstrates the point more clearly. Shimizu, for example, decided to implement the free-address offices in the Structural and Construction Engineering Departments largely because the free-address office was so successful in the Planning Department. These two

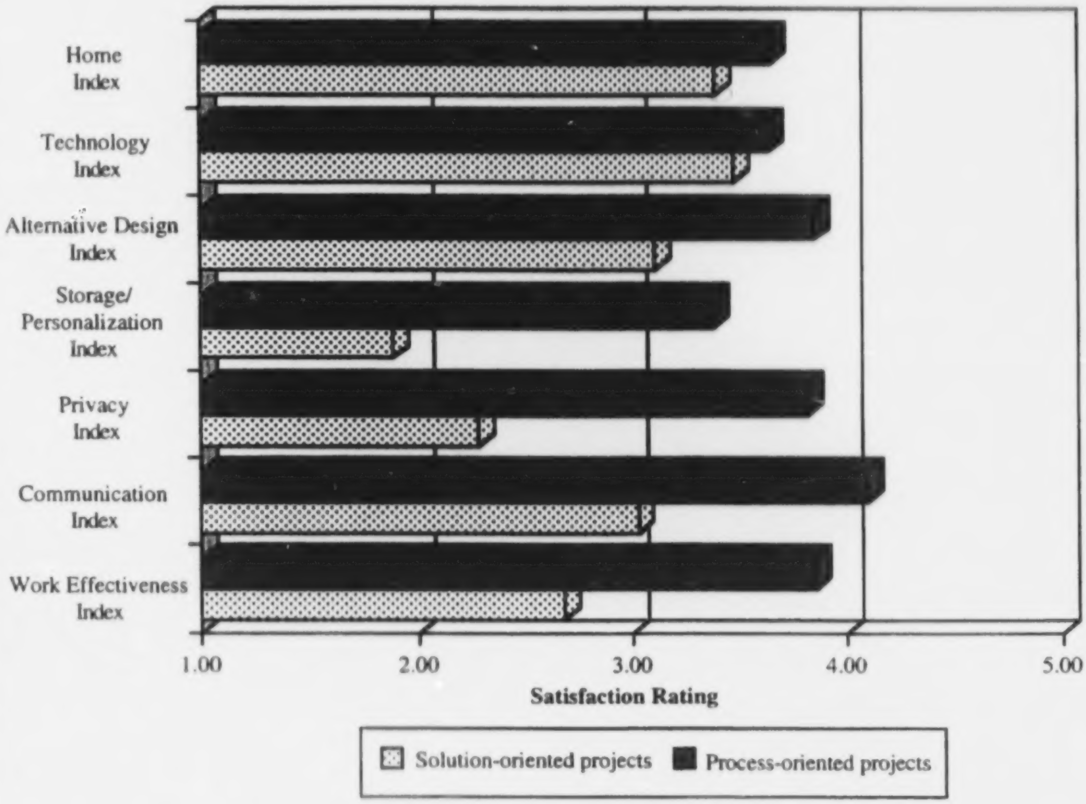


Figure 11: Solution- vs. Process-Oriented Innovations: Satisfaction with the Project

later implementations, however, were rejected shortly after being implemented. The solution may have been too far removed from the end users to adequately meet their work requirements. The absence of any user involvement in the process of developing the solution also meant that training and preparation for the new way of working was missing.

A similar situation occurred at DECsite. The Natural Office was so well received by the users that the idea spread throughout the building. When trying to implement the concept on a large scale in other departments, the DECsite consultants initially had a very difficult time getting the new users to accept the project. Again, the solution may not have corresponded as well to the user needs and work patterns of the new user group as it did to the original DECsite group. With time, many of the problems were

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worked out in the office, and it appears that the new project will be as successful as the first, but it took the users more time to adjust to the new environment than it did in the first implementation.

In addition to having more influence over the solution, early users also had "pioneer" status; the users were the first people to try a new concept and had certain benefits and experiences that people in later implementations did not have. For many employees the excitement of being a "pioneer" participating in a special project can be highly motivating and energizing. Involvement in such projects often creates unusual opportunities to influence one's work, and to interact with management and others in the organization in ways that go far beyond those experienced in the day-to-day routines of work. Employees who later work under the new "standard" but without the same opportunities to influence it, are likely to react in a less positive way.

Both of the above examples bring up another very important issue: the influence that a strong champion can have over the success of the project. Champions of the system, especially when they are "converts" or high-level employees (i.e., people that are not easily biased towards the new concept) can help encourage other users who may be reluctant to try the new way of working. These champions will often take on the "grumblers" in the office, who, for one reason or another, are having a difficult time accepting the new system. If the users are not as actively involved in the process, it may be difficult to "recruit" these champions because employees do not necessarily see or understand the benefits that the system has to offer them.

In the case of DECsite, the planners had to spend extra time and energy in going back into the implementation and "nurturing" the new way of working. They had to provide additional support to the users and actually create champions of the system by working with people on an individual basis. As a result of their efforts, the new system became much more popular and began running more smoothly.

In the case of Shimizu, the only champions of the system (e.g., the Planning department managers) were too far removed from the users in Structural and Construction Engineering to help the users adapt to the new system. Champions in these departments never surfaced, and the concept was eventually rejected.

Cost of the Different Projects

As was the case with the business and cost strategies, it is difficult to find trends in the costs associated with a process or solution approach. All of the projects experienced initial space savings. The cost associated with the different approaches becomes better defined after the implementation. Again we see examples of "pay now or pay later;" the costs were often shifted from the initial outlay to later ongoing costs. The process-oriented project tended to have its costs up front, particularly with regard to the time and effort spent on studying and preparing the users; more time was spent in the process stage because, with each iteration, project managers had to work with the users to determine how they were working now and how they could be working better, to help them tailor a workplace solution that supported the new way of working. In three out of the four solution-oriented projects—Ernst & Young, DECsite, and IBM—the managers/project planners went back into the implementations to help correct problems which seemed to go beyond "teething pains," particularly in the course of later iterations of the project. Shimizu was the only organization that did not go back to help work out problems in the later generations, and these projects later were rejected.

Innovativeness of the Projects

The innovativeness of the project did not appear to be linked to whether the project was process- or solution-oriented (e.g., DECsite was solution-oriented and very innovative, as was SOL, which was process-driven). This factor appeared to be influenced more by whether it was cost- vs. business-driven.

Business Summary for Process- versus Solution-Driven Strategies

The following two tables highlight some of the major differences between process- and solution-driven strategies. The first table contrasts the two approaches according to their implementation process, while the second table illustrates the differences in terms of the success of the projects that used these approaches. Both types of strategies offered benefits to the organization, but the process-driven projects tended to outperform the solution-driven projects.

Table 9: Summary of the Implementation Process for Process- and Solution-Driven Strategies

	Process-Driven Strategies	Solution-Driven Strategies
Meet organizational challenges	———	———
Reassess how/where work is done	• With each implementation, the process of reassessing how/where employees are working started from "scratch"	• Less focus on this phase of the process in later generations of the concept • Often used standards set in first implementation
Fundamental changes in business practice	• With each implementation, the changes that occured in the business practice were often unique	• Less focus on this phase of the process in later generations of the concept • Often used standards set in first implementation
Develop alternative workplace strategies	• Solutions developed in this phase were unique to each implementation	• Workplace strategy remained constant throughout all generations—refinement of standard solution
Change management to support organizational change	———	———

Table 10: Summary of the "Success" of Process- and Solution-Driven Strategies

	Results	Explanations
User satisfaction and work effectiveness	• Process-driven projects had significantly higher user satisfaction for the majority of issues compared to solution-driven projects	• Process-driven projects were more user-oriented • Solution-driven projects tended to be more removed from the user
Duration and acceptance of the innovation	• Project-driven projects appeared to have greater acceptance in the organization initially	• Strong champions were more evident in process-oriented projects • Solution-driven projects tend to be more removed from the user
Cost of the innovation	• Difference in when process and solution-driven projects experienced cost	• Solution-oriented projects often had to be revisited—more "nurturing" of the users • Process-oriented projects experience this cost up front
Innovativeness of the project	—	—

Strategic versus Independent Initiatives

While we classified the organizations according to whether their innovation was strategic versus an independent initiative, there were, in fact, several variations within this classification. In review, the classifications for the innovations were as follows:

Table 11: Review of Strategic versus Independent Initiative

	Strategic vs. Independent
IBM, UK	Strategic
Ernst & Young, UK (MCS)	Independent
DECsite's Natural Office	Independent
SOL Headquarters	Strategic
Shimizu	Independent

A strategic model for implementing an innovation is one that begins from the highest level within the corporation and becomes a corporate standard for doing business. Figure 12 depicts what a strategic model would look like conceptually.

The two strategic examples that we studied were IBM, UK and SOL. In both cases, the innovation was at the corporate level and was implemented as part of a corporate-wide program.

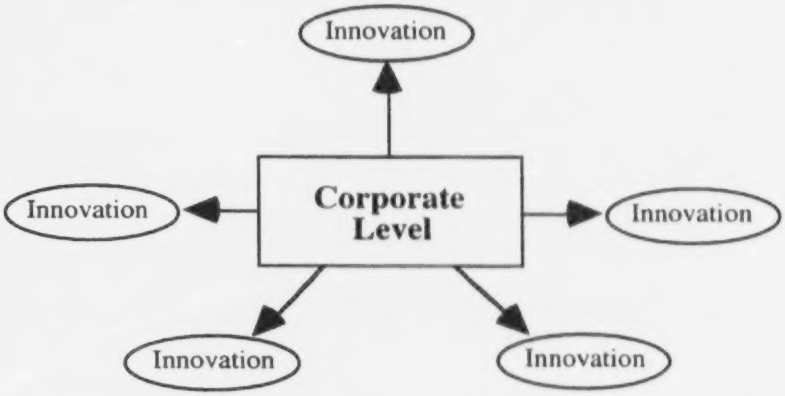

Figure 12: Strategic Innovation Model

We found three distinct patterns within the independent initiatives in terms of the innovation's influence on the organization. The first example is what we refer to as a "classic" independent initiative. The classic independent initiative is one where similar innovations occur within separate parts of the organization without an interaction between the different projects. For example, if offices in California and New York both develop a similar innovation without consultation between the two, that would be classified as a classic independent initiative. The Digital Office of the Future in Finland and the Natural Office at DECsite in Sweden were examples of a classic independent initiative. Figure 13 illustrates this pattern.

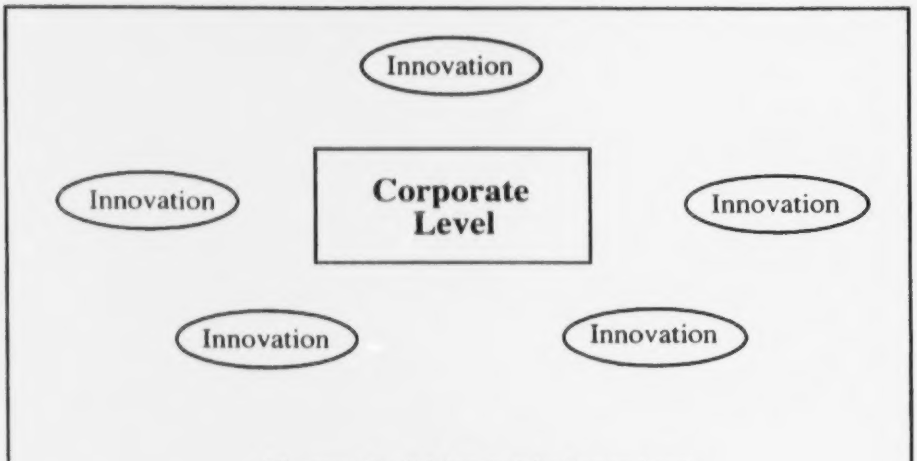
Innovation
Innovation
Corporate Level
Innovation
Innovation
Innovation

Figure 13: "Classic" Independent Innovation Model

A second variation on the independent initiative is what we refer to as a "serial" independent initiative: an innovation that begins as an independent initiative, but then spreads throughout the organization. Both Ernst & Young and Shimizu were examples of this type of model. In each case, an autonomous project began within an organization, which later spread to other autonomous projects. Figure 14 portrays this type of project.

The third variation of the independent initiative is one in which the innovation begins as an independent initiative, but later becomes a strategic initiative. Figure 15 depicts this type of model.

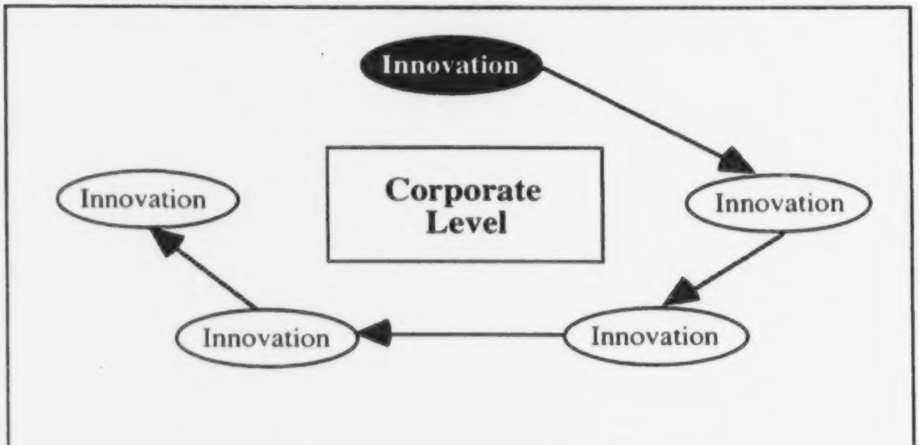
Innovation
Innovation
Corporate Level
Innovation
Innovation
Innovation

Figure 14: "Serial" Independent Innovation Model

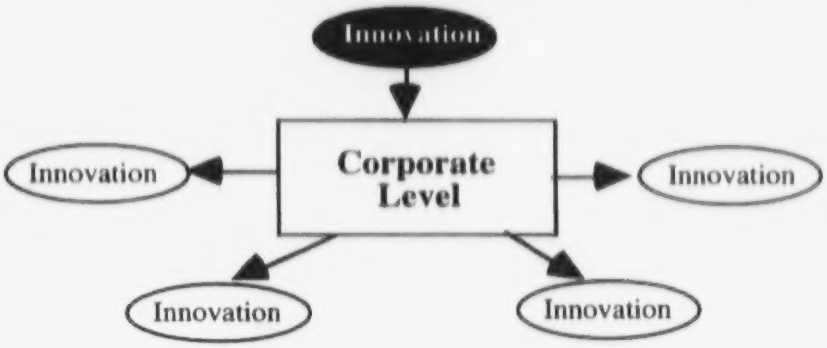

Figure 15: Independent-to-Strategic Innovation Model

Table 12 is a refinement of our original classification table to take into account these variations within the strategies.

There appeared to be no consistent pattern as to whether the innovation was strategic or independent in terms of the implementation process. In almost all of the cases we examined, the tendency was to standardize aspects of the process, regardless of whether the innovation was strategic or independent. In most cases, the project managers used an abbreviated process cycle in later installations.

Table 12: Refinement of Strategic versus Independent Initiative

	Strategic vs. Independent
IBM, UK	Strategic
Ernst & Young, UK (MCS)	"Serial" Independent
DECsite's Natural Office	"Serial" Independent
SOL Headquarters	Strategic
Shimizu	"Serial" Independent
(Digital Equipment Corporation —Finland, Sweden)	"Classic" Independent
(Chiat/Day, U.S.)	Strategic
(Ernst & Young, U.S.)	Independent-to-Strategic

Parentheses indicate companies that we did not study for this project, but for which we have information through our own research or research conducted by outside sources.

Because we were not able to collect survey data on multiple sites at DECsite and SOL, it is difficult to tell whether these projects followed the aforementioned trend. Of the three other multiple sites we researched, however, two of the three—IBM and Shimizu— used a condensed version of the implementation process cycle, focusing less attention on the reassessment, change in business practice, and alternative workplace strategy phases (see Figure 16: Condensed Implementation Process Model).

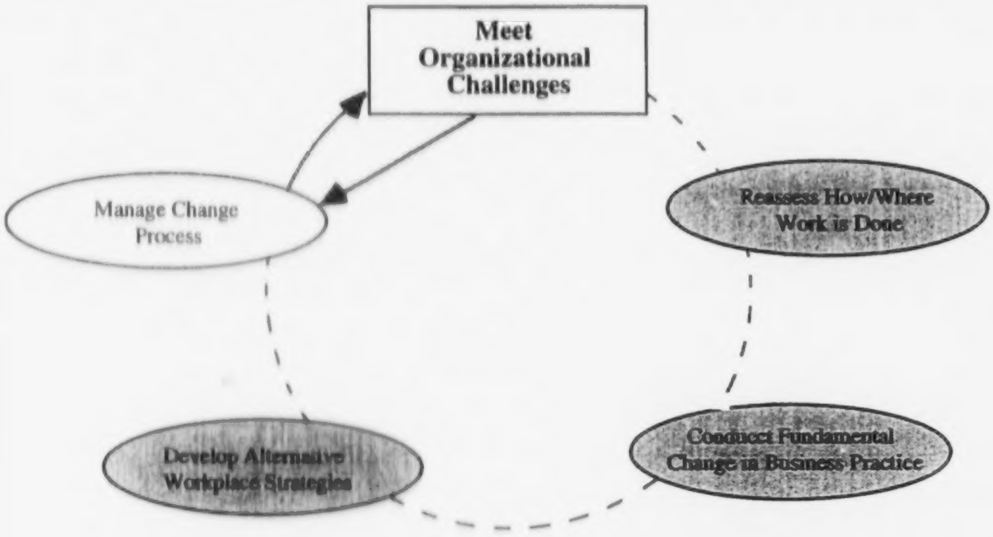
Meet Organizational Challenges
Manage Change Process
Reassess How/Where Work is Done
Conduct Fundamental Change in Business Practice
Develop Alternative Workplace Strategies

Figure 16: Condensed Implementation Process Model

Ernst & Young, UK, on the other hand, followed almost the reverse pattern of these two other sites, with the implementation process in the later generations of the project actually becoming richer. As Figure 3 on page 21 illustrates, the second implementation process for shared-assigned offices included phases that had not been emphasized in the earlier implementation.

User Satisfaction and Work Effectiveness for Strategic and Independent Initiatives

The mean scores for the two strategic projects (SOL, IBM) and the three independent initiatives (Ernst & Young, DECsite, and Shimizu) were averaged across all of the survey respondents. When the difference in the sample size was considered, the mean satisfaction for strategic initiatives was slightly higher than that of independent initiatives (t= 2.054, df= 534, p=

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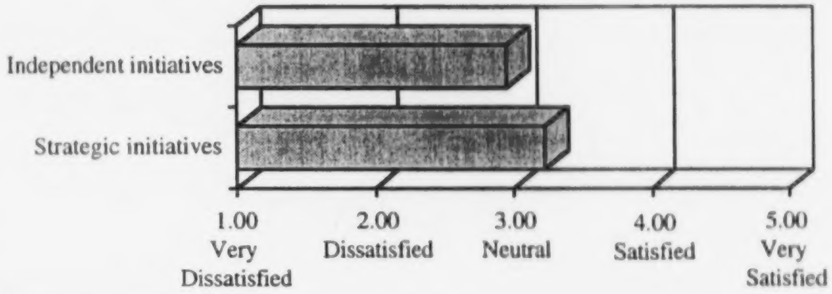
Figure 17: Overall Satisfaction for Strategic vs. Independent Initiatives



0.0404).

User satisfaction means for work effectiveness and other issues in the new office environment (home, technology, space/design, storage/personalization, privacy, and communication) were also statistically about the same ($p > 0.05$), with the exceptions of technology, home, privacy, and storage/personalization issues. Of these issues, technology means were higher for strategic initiatives ($t=7.179$, $df= 527$, $p<0.0001$); home means were higher for strategic initiatives ($t=3.139$, $df=425$, $p=0.0018$); privacy means were higher for strategic initiatives ($t=2.164$, $df=534$, $p=0.0309$); and storage/personalization was higher ($t= -3.368$, $df= 533$, $p=0.0008$) for independent initiatives (see Figure 18: Strategic vs. Independent Initiatives: Satisfaction with the Project).

One hypothesis regarding these similar scores suggested that perhaps the differences in the means for strategic and independent initiatives would become greater in organizations which had implemented multiple generations of the project, particularly in later generations. When we compared the survey responses for IBM, UK and Ernst & Young, UK (the only two organizations for which we have survey data on multiple generations), we found this hypothesis to be invalid. The means for all of the projects at each of the organizations were very similar, as well as the means for later generations of the project.

Duration of the Projects and the Acceptance of the Innovation Throughout the Organization

As was the case with the other measures of success of the different projects,

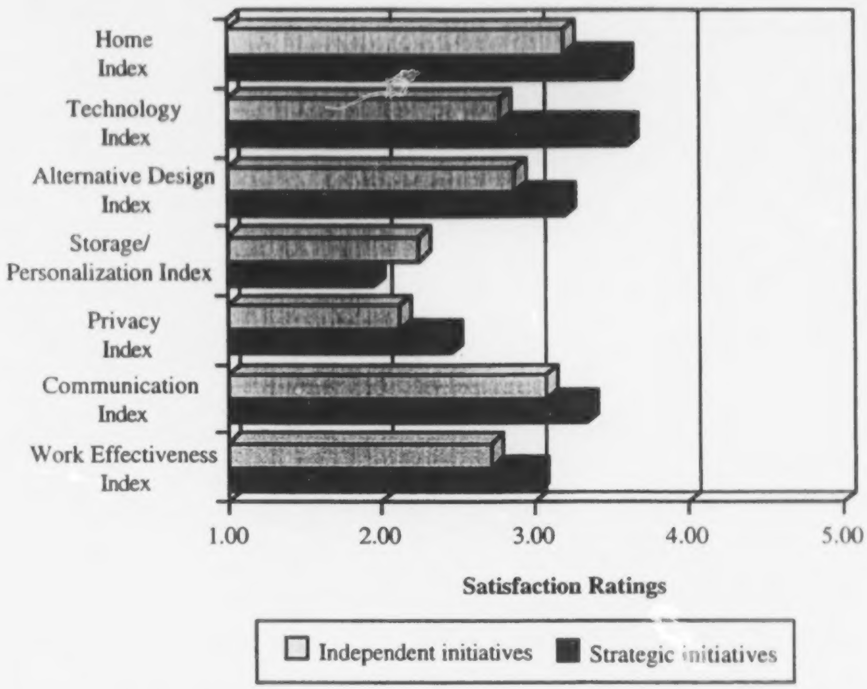


Figure 18: Strategic vs. Independent Initiatives: Satisfaction with the Project

there did not appear to be any patterns relating the lifetime or acceptance of the projects to whether they were strategic or independent.

Cost of the Different Projects and Organizational Learning

For strategic and independent initiatives, it seems appropriate to discuss the cost of the projects and the organizational learning that occurred within the organizations in conjunction, since much of the savings realized by the organizations resulted from organizational learning. As mentioned earlier in this section, the common tendency among all of the initiatives was to try to condense the implementation process for later projects. The desire to omit phases of the process was based on the premise that certain things were learned from previous projects, and therefore did not need to be emphasized as strongly in later projects. Strategic and serial independent initiatives seem to be very parallel in this characteristic. Both IBM, UK and Shimizu were able to shorten the planning and design process, and therefore save both time and resources associated with this phase. Because the alternative workplace strategy had been developed in previous projects, the reassessment phase was eliminated from the process, and the data collection period was eliminated or significantly reduced (e.g., using prescribed ratios based on general occupancy data decreased the data collection—time-lapse photography—from one year to one week, etc.).

An interesting case that does not seem to hold to this pattern is Ernst & Young, UK. Rather than being abbreviated, the process for the second implementation was actually richer. This was primarily a result of organizational learning. In the first implementation of shared-assigned offices, the facility managers determined that they had not spent enough time planning the project, and they therefore amended this practice in the second implementation. While they did not save initial time and resources in the implementation process, it was an attempt on the part of the facility managers to reduce costs in the long run by ensuring the project's success.

Innovativeness of the Projects

In terms of innovativeness of the projects, it again appears that there was no difference attributable to whether the projects were part of a strategic or an independent initiative. Our sample included examples of both strategic and independent initiatives that were innovative in their own right; SOL and DECsite, respectively.

Summary of Workplace Strategy Comparison

Table 13 summarizes our findings for each of the implementation strategies when compared to our measures of success.

Table 13: Which Approaches Outperformed Their Counterparts?

	Business vs. Cost	**Process vs. Solution**	**Strategic vs. Independent**
User satisfaction	Business	Process	—
Work effectiveness and satisfaction by issue	Business	Process	—
Lifetime of the project	Business	Process	—
Acceptance throughout the organization	Business	Process	—
Cost (less expensive in terms of time, resources)	—	—	—
Innovativeness of the project	Business	—	"Classic" Independen
Organizational learning	—	—	Strategic and "Serial" Independent

Our predictions at the beginning of the study for cost- vs. business-driven projects was that the cost-driven projects would be more standardized, place less emphasis on the process, have less innovative workplace solutions, and be less self-sustaining (have shorter lifetimes) when compared to business-driven projects. As Table 13 illustrates, our findings generally concurred with our original hypothesis in all areas.

Our predictions for process- vs. solution-oriented projects were that solution-oriented projects would be less innovative, have a shorter implementation process, be more standardized, and be less expensive to implement than process-oriented projects. Again, our findings were generally in line with these original hypotheses. There were, however, exceptions to our predictions. For example, The Natural Office was very innovative in its workplace solution for a flexible office, even though it was solution-oriented. Subsequent iterations of the project, however, will in all likelihood bear our hypothesis out.

In terms of strategic vs. independent initiatives, our findings did not necessarily agree with our original hypotheses. We expected that we would see more organizational learning with strategic initiatives than we would with independent initiatives, and that independent initiatives would be more expensive and more tailored to the individual group. In the course of our research, however, we found that there were multiple variations of independent initiatives, including "classic" independent, "serial" independent, and independent-to-strategic initiatives. Our predictions were most accurate for classic independent initiatives. Serial independent initiatives, on the other hand, seemed to parallel strategic initiatives in the amount of organizational learning occurring from one implementation to the next, as well as in the tendency to standardize the solution.

Summary of Key Findings

The objective of the ***Implementing Innovative Workplaces*** study was to examine a range of organizational issues associated with implementing innovative workplace practices, primarily those that involved non-territorial offices over time. Of particular interest was the planning and implementation process used to introduce the different innovations. The following section summarizes our findings for each of the key research questions posed in the *Introduction* of this report as they apply to all of the organizations in our research sample.

- *What factors (e.g., planning and design process, nature of technology, design of the setting) tend to change the most as projects evolve?*

As the projects evolved, the biggest changes that we witnessed occurred in the planning process. Referring to the implementation process model, many of the projects omitted or did not emphasize certain aspects of the process, particularly in later generations. The primary components that were left out of the process were the reassessment of how/where work is being done (i.e., work patterns), fundamental changes in business practices (i.e., training, changes in work processes, changes in management practices/philosophies, changes in work behaviors), and the development of alternative workplace strategies that were tailored for each group of end users (i.e., implementing a "standard" solution).

Design and space, while they did seem to be refined over time, were generally more stable across the implementations. Most of the changes that we saw in design and space were "evolutionary" changes that occurred as a result of advances in technology or refinements in standard designs based on organizational learning.

- *What aspects of the new workplace system tend to become standardized or uniform?*

The actual workplace solutions tended to be quite standardized, especially in the solution-oriented projects that predominated in our sample. To decrease the time and resources spent in the planning process, project managers would take an environment that had been created for one group (based on their work patterns and needs), and implement it for another group, making mostly minor changes in the solution. In terms of the design and technology, this, too, appeared to be standardized in line with the solution. We did see some variations in technology and design over time as technology improved and design became more refined, but these aspects were meant to support the standard solution, and often became standardized in the process.

- *As organizations expand their implementation of new workplace strategies (within or across sites), does employee response tend to improve, remain the same, decline, or is there no consistent pattern at all?*

Whether user satisfaction improved or declined appeared to depend on the approach to implementation. In cases where the implementation process emphasized all stages of the implementation model or had the same emphasis as in earlier projects (e.g., Ernst & Young), user satisfaction stayed the same or increased. When phases were omitted from the process, user satisfaction generally declined.

- *What differences are there in cost and employee response (satisfaction, work effectiveness) as a function of whether the workplace system is primarily cost-driven versus business-driven ?*

As discussed in the previous section, business-driven projects tended to outperform cost-driven projects in terms of user satisfaction, work effectiveness, project duration, and acceptance throughout the organization. They also tended to have more innovative workplace solutions.

- *What are the organizational implications of solution-oriented vs. process-oriented workplace systems?*

Similar to business-driven models, process-oriented projects outperformed solution-oriented projects in terms of user satisfaction, work effectiveness, duration, and acceptance throughout the organization. In general, they also tended to have more innovative workplace solutions, although there were some exceptions. Solution-oriented projects, however, were generally less expensive to implement.

- *How does the implementation process change as the project moves from small projects to widespread implementation? Is it necessary to focus as much attention on design, technology, and planning pro-*

cess in second and third installations to ensure success patterns similar to those achieved in the pilot project?

As the project moves from a small scale to wider implementation across the organization, the implementation process became less intensive; phases of the process, in particular those related to careful assessment of the nature of the work process, were either omitted or emphasized less in later implementations. Our findings indicated that the process was one of the most important factors contributing to the success or failure of the project, including the organizational objective of the project (see *Part II*).

The design and technology did not have as great an impact on the overall success of the project (see *Part II* for more details). In fact, as less attention was placed on the process and more on the design and technology over time, user satisfaction and work effectiveness actually decreased in several of the sites we studied—although in several cases the technology significantly improved over time (e.g., lighter, faster laptop computers were supplied; telephone systems were enhanced).

It would appear that user expectations about technology are likely to always exceed the capabilities of technology available in the office. Given the speed of new introductions of technological products, few companies will at any moment have the latest version of software and hardware available on the market. Thus it is not surprising that, despite the introduction of new technology, user satisfaction remained stable or even declined.

- *What is the nature of organizational learning that occurs as a function of whether the workplace system is process- vs. solution-driven, cost -vs. business-driven, or part of a strategic initiative versus an independent initiative?*

Organizational learning appeared to be primarily linked to whether there was consultation between the sites. For example, the serial independent initiatives and the strategic initiatives both exhibited organizational learning. In serial implementations, the original site helped establish subsequent installations. Those sites had the benefit of hindsight from the earlier projects, as was also the case with strategic initiatives. Classic independent initiatives tended to have less organizational learning (or it was harder to come by), in that the organization had to conduct its own research on similar implementations, either within or outside their organization).

We found that organizational learning was not limited to any single component of the process, but occurred across all aspects (technology, design, management practices and philosophies, etc.).

Lessons Learned

The findings from our case studies suggest that the following factors are critical to successful implementation of alternative workplace strategies involving non-territorial offices:

- The presence or absence of a strong champion is very important to the success/failure of the project. In cases where there was at least one strong champion of the innovation working closely with the end users, user satisfaction and acceptance of the innovation was much greater. Situations where the champion worked in the new workplace were more likely to be business-driven and process-oriented than those which were led by persons assigned as part of their job to implement a new workplace strategy.

- Many issues that management may feel are barriers to implementing innovative ideas are *perceived* barriers. For example, storage, personalization, and privacy were all issues that managers focused on when trying to implement an alternative workplace. Satisfaction with these factors tended to decrease as a result of implementing alternative workplace settings involving non-territorial or open environments, but these issues were very low on users' lists of priorities. Users did not seem to be as sensitive to these issues as managers expected.

- Few companies had implemented an *integrated* workplace strategy; that is, one in which users have access to a wide array of settings, both inside and outside the "office" (dedicated project rooms, quiet rooms, and informal break areas in the office, home, client site, airports, hotels, etc.), supported by appropriate technology, business processes, and organizational culture. Eliminating ownership of a desk, office, or workstation without providing a richer, more varied set of work settings that truly supports the full range of work activities will generate resentment, dissatisfaction, and lower levels of performance.

- The organizational challenge that encourages organizations to implement innovations is very important. Organizations that take a business-oriented approach seem to have more success in implementing the innovations than those that take a cost- or real estate-oriented approach. A business orientation to the innovation gives managers and employees more incentive to implement the innovation, and more incentive to make changes in business practices (including management philosophies and practices, corporate culture, etc.). The business-oriented approaches recognize that the workplace is a complex system in which all elements must work in harmony, rather than simply change how space is assigned.

- User involvement is very critical to the success of the project. It is costly and time-consuming, but it is necessary to ensure that the workplace strategy fits the employees' needs and requirements, that they understand the nature of the innovation to be implemented, and that they directly experience the benefits of implementing the innovation. The implementation process in the more business-oriented approaches becomes, in fact, a form of organizational development. It helps people think about the nature of the work they are doing, why they are doing what they do and the particular way in which they do it. It also helps them focus on identifying and inventing better ways of working.

- Significant cost savings occur in both business-driven and cost-driven approaches. However, in the business-driven approaches a portion of the savings associated with increasing the ratio of people to offices or workstations is reinvested in specific types of functional areas (e.g., dedicated project rooms, informal meeting areas, quiet rooms) that would not otherwise be feasible. Our data indicated that reinvesting a portion of the cost savings was likely to result in a far higher level of employee satisfaction and self-reported productivity than in the more purely cost-driven approaches.

- Using a pilot project as a laboratory from which a standardized solution can be developed and then applied "cookie cutter" fashion was associated, in our study, with significantly lower levels of employee satisfaction and productivity. One of the "gets" for those employees who "give" up their ownership of a personal workspace is the opportunity to help create a solution that is tailored to their group's particular work patterns and needs.

- Eliminating the reassessment and data collection phases of the process, or emphasizing these phases less strongly, will save money and time up front. It is likely, however, to require revisiting and modifying the original workplace solution to a greater extent than occurs when these phases of the implementation process are included from the beginning. In effect, organizations have the freedom to "pay now or pay later." There is no free ride when it comes to process.

- Related to the above point, employees asked to work in significantly different ways need time and help in developing effective work patterns. Champions who model the desired behavior are a very effective way of helping people learn new behavioral patterns; formal training and support is also important, especially in learning how to use new technologies.

- Some of our most interesting and innovative examples were found in Scandinavia (SOL in Finland and DECsite in Sweden). Rather than the culture per se, however, the critical factor seems to be the presence of a strong champion with a vision of how the alternative workplace might look and operate. Chiat/Day in Los Angeles and Work/Family Direction in Boston, for example, have recently implemented very imaginative workplace solutions that mirror in some ways those of SOL and DECsite. Both had very strong executive champions. This, more than the firm's nationality, seems to account for the more innovative workplace.

  This should not imply that there are not differences as a function of national context. There undoubtedly are, but there are also strong regional differences within the United States. Process-oriented approaches are one way to account for such differences, while maintaining consistency in the underlying principles guiding the search for the particular solution appropriate for a specific context.

In the final analysis, some of the differences we found relate to control; or, more precisely, what the organization wants to control. For most of the organizations we studied, the focus of control was on cost reductions. For a few, the focus was on creating a better way of working, using new ways of assigning space to break down conventional thinking about what constitutes the most effective way to work. In these cases there were also cost savings, but they were more a secondary benefit than the driving force for change. What is the bottom line for organizations? It is the difference between saving costs in the short run (which may reduce the effectiveness of the organizations most expensive resource), versus reinvesting cost savings from using space in new ways to support new work patterns that enable employees to work more effectively and productively. The latter approach views culture change not as an undesirable side effect of assigning space in new ways, but the goal itself.

Part II: Findings for Individual Organizations

IBM, United Kingdom

Workplace Strategy Overview

IBM, UK was one of the first organizations we know of to implement non-territorial offices as part of a broad strategic initiative. IBM refers to these offices with the acronym "SMART," which stands for *Space Management and Required Technology.* The primary goal/driver of the SMART program was to contain and reduce facility costs by reducing space requirements. A secondary goal, seen more as a "bargaining tool" of the program, was to improve worker productivity by providing employees with new technology to support work patterns. These goals and drivers were part of the strategic initiative and remained virtually unchanged for each site involved in the SMART program.

The premise behind this workplace strategy, based on systematic observational data of actual occupancy patterns, is that not all employees spend the majority of their time in the office. Many staff, especially sales, consulting, and engineering staff, spend from 50 to 70% of their time away from their workstations, with clients, at home, traveling, etc., and there-

Goals/Drivers of SMART

- *Contain and reduce facility costs by reducing space requirements.*
- *Improve worker productivity (secondary goal).*

Principles of SMART

- *Less than 1:1 ratio of unassigned desks for employees who spend majority of time out of the office.*
- *Provide technology to support flexible working.*

Photo 1: IBM Bedfont SMART Workstation

fore do not need a workstation 100% of the time. Reducing the number of desks/offices per employee saves space and thus reduces facility costs.

The two main principles driving SMART from its inception have been the provision of a less than 1:1 ratio (7:10) of unassigned workstations for employees who spend a large portion of their time out of the office, and the provision of the latest computer and telecommunications technology to support highly mobile workers. As the concept has evolved, a third characteristic has become the provision of common areas (meeting rooms, project rooms, quiet areas, etc.) available to employees on an "as needed" basis.

Using non-territorial offices, IBM has realized a savings in total area per person at each of the sites. For example, in the pilot project at South Bank, IBM saved close to 500 square feet in office space as a result of SMART, which translated to an annual lease savings of over $65,000 (see Table 14: South Bank Cost Savings). With that savings, IBM was able to provide employees with newer and better technology: e.g., laptop computers, printers, a more sophisticated telephone system, new home computers, and other new technology in the office. In some of the more recent installations, IBM also reinvested a portion of the space saved from using less than a 1:1 ratio of unassigned workstations to give employees access to new functional areas like common rooms and quiet rooms, while still maintaining an overall savings.

Figure 19 (on page 68) is a timeline depicting when various non-territorial sites were implemented. The first SMART pilots were set up in

Table 14: South Bank Cost Savings

Annual lease cost for individual workstations (1,610 s.f.@ $134)	$215,740
Annual lease cost for non-territorial space (1,120 s.f.@ $134)	$150,080
ANNUAL LEASE SAVINGS	**$65,660**
Cost of new equipment: (46 PC's @ $6125)	$281,750

Source: Becker, F., Sims, W., & Davis, B. (1991). Managing space efficiently: Final summary report. New York: Cornell University International Facility Management Program, NYS College of Human Ecology.

Glasgow and South Bank in October and November 1990, respectively. Since then, the idea has spread throughout IBM, UK, with implementations in six additional sites, and plans for implementation in several more locations. The idea of non-territorial offices has spread internationally throughout IBM as well, with a major project in Japan, more than 30 sites in the United States in use and another 20 planned, and virtually all of the Canadian sales organization now using a form of non-territorial office.

For the purpose of this report, we focused on six of the SMART implementations: Glasgow; South Bank CP&S; Warwick I; City of London at South Bank; Bedfont Lakes; and Warwick II. These sites represent the infusion of SMART throughout IBM, UK as accurately as possible, with the exclusion of installations in Newcastle and Aberdeen. These two sites were not included in the study primarily because of lack of resources and access on the part of the IWSP research team.

"I could be out of the office for long periods depending on the project. I live about 120 miles away from Bedfont Lakes, so I try to just come in for meetings. I probably spend 50% of my time in an IBM office somewhere, but not necessarily at Bedfont Lakes. There is another IBM office closer to my home, and although I am not based there, I will work there if I cannot work at home." (From user interview at Bedfont Lakes)

Number of Employees in SMART

Since the initial pilot in late 1990, the total number of employees at our research sites who work in this type of environment has risen from 62 to almost 1,500 (see Figure 20: Total Number of People in SMART Over Time). This climb, however, was not necessarily traceable to the project's sequence in the total implementation scheme. Our expectation had been that the numbers involved in each installation would increase continually over time as the innovation grew from a small pilot to a standard practice. As shown in Figure 19, the first two projects were relatively small. The number of users in the third installation increased, but then dropped off again in the next three installations. We saw a rise in the number of users in the Bedfont installation, the largest installation of SMART to date, but the numbers fell again in the next installation. The number of users introduced to SMART in the final installation observed for this report—Warwick II—increased yet again.

There appear to be two reasons why projects varied in size over time. One is that in some cases individual groups of users heard about the program and decided to convert their offices to SMART, even though they were not slated for the project by the Country SMART Program.[5] This was the case, for example, with Warwick I (see Appendix A). Warwick

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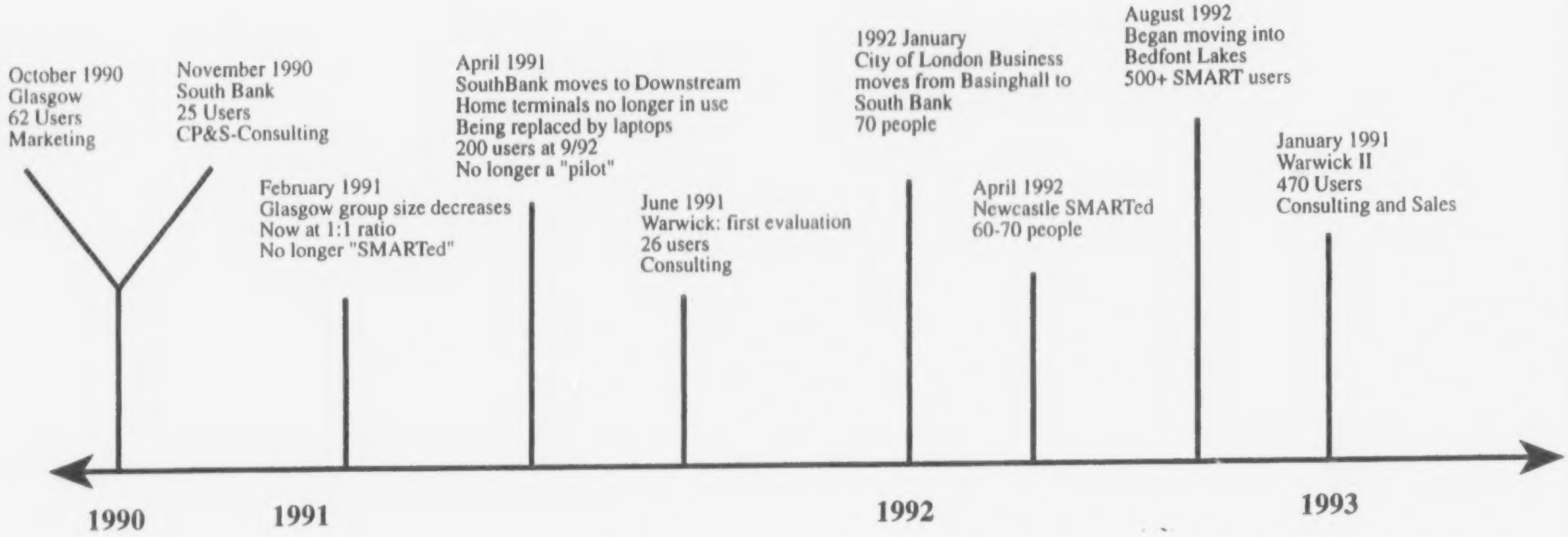
[5] See "Implementation Process Background."

Figure 19: IBM, UK Timeline


October 1990
Glasgow
62 Users
Marketing
November 1990
South Bank
25 Users
CP&S-Consulting
February 1991
Glasgow group size decreases
Now at 1:1 ratio
No longer "SMARTed"
April 1991
SouthBank moves to Downstream
Home terminals no longer in use
Being replaced by laptops
200 users at 9/92
No longer a "pilot"
June 1991
Warwick: first evaluation
26 users
Consulting
1992 January
City of London Business
moves from Basinghall to
South Bank
70 people
April 1992
Newcastle SMARTed
60-70 people
August 1992
Began moving into
Bedfont Lakes
500+ SMART users
January 1991
Warwick II
470 Users
Consulting and Sales
1990
1991
1992
1993

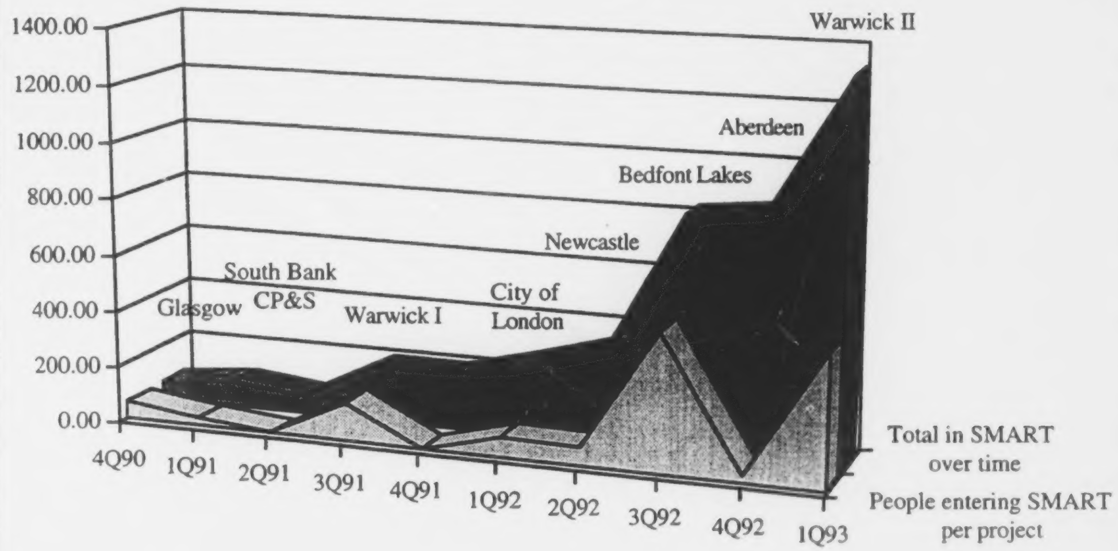


Figure 20: Total Number of People in SMART over Time

users were faced with having to relocate to a new site, because the current site could no longer house them due to growth in the department. If, however, they chose to adopt some form of desk-sharing strategy, they would be able to remain at the Warwick location. The Business Manager turned to SMART as a solution without formally being approached as a SMART participant.

Another reason for the varying group sizes was that IBM recognized that not all job types could work in a non-territorial environment in which the workstations were unassigned. Only certain businesses entered into the SMART program. These businesses were customer-oriented and required employees to be out of the office over 70% of the time. It would have been extremely difficult and/or impractical for IBM to consolidate these groups; therefore, several smaller implementations took the place of a single large one.

Job Types

All of the groups involved in SMART were marketing, consulting, engineering, and/or sales type jobs that required the employees to spend time out of the office with clients. Support staff and other employees who spent the majority of their time in the office were assigned permanent workstations. These people were commonly referred to as "location-based" or "static" workers at IBM.

Cost Savings Associated with SMART

As mentioned above, IBM experienced a cost savings as a result of the SMART implementations. Some of this cost savings was reinvested back into the organization as technology and renovation expenses. It was very difficult to obtain cost information for the different installations, either because this information was not available, or because it was not public knowledge.

In addition to the cost data for South Bank CP&S (see Table 14), we also have general space savings criteria for Bedfont Lakes. The creation of the Bedfont Lakes facility enabled IBM to close three of its previous buildings (Brentford, Richmond, and Chiswick) and house these users at a single site. Without SMART or some other form of alternative office environment, this consolidation would not have been possible; 1,000 users were able to occupy a building that, under traditional office space allocation, would have housed only 600.[6] We can assume, that since the same ratios were used at all of the sites, that each location had similar space savings.

The Development of the SMART Concept

SMART was developed as part of a strategic initiative to reduce IBM's real estate costs throughout the United Kingdom. A multi-disciplinary group was formed at IBM in early 1989 to research alternative office environments for IBM. This group included people with backgrounds in MIS, human resources, facilities management, and management. This group was responsible for researching the feasibility of implementing a pooled or shared desk system at IBM as part of a corporate plan to reduce real estate, and was instrumental in the early information-gathering process.

Along with this group, IBM employed an outside consulting firm to help establish how much and for what purpose space was being used. This consulting firm collected data through four primary means: a space occupancy survey, a space activity survey, interviews, and a space audit.[7]

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[6] (1992). £100 Million joint venture bears fruit. Corporate Members News. London, England.

- *The Space Occupancy Survey*: an observational survey that required an observer to note whether a workspace was occupied, and if so, if it was being used by an individual or for a meeting.
- *The Space Activity Survey*: an observational survey to reveal how space was being used by employees; what they were doing when they occupied a particular space, such as meeting with people, using the phone, paperwork, etc.
- *Interviews*: conducted with managers and staff by the consulting firm to help establish typical work patterns.
- *The Space Audit:* measured how much space was being used at the time and for what purpose. The space audit was conducted only at two sites and only on typical floors.

Table 15: Data Collection Performed by Outside Consultants at IBM

Data Collection Technique	Total Number of People	Total Number of Locations
Space Occupancy Survey	Over 2,000	4
Space Activity Survey	700	2
Interviews	77	4
Space Audit	—	2

From this data and the research conducted by the multi-disciplinary group, IBM was able to develop the SMART concept and a standard set of guidelines for the SMART office design. As discussed in *Part I* of this report, this type of approach to implementing innovations (using a standard workplace solution for all implementations) is what we refer to as a solution-driven workplace strategy.

SMART set guidelines for desk-to-employee ratios for the departments to use based on the observational data collected by the consultant. The SMART plan also recommended the technology and additional spaces the SMART employees would require (equipment rooms, project rooms, break areas).

Once the SMART concept was developed, a smaller group, called the Country SMART Program team (SMART team), was formed. This smaller

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[7] Alexi Marmot Associates (1991, May)..IBM space occupancy and SMART space. London.

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group presented the SMART concept to prospective sites, and helped coordinate the implementation when a site agreed to participate. The team consisted of a Project Administrator, technology advisors, and additional representatives (MIS, human resources people, etc., as necessary).

Although the Country SMART Program published a SMART Blueprint in February of 1991 that defined the concept and developed a guideline for implementing SMART, the planning process, design, and technology varied slightly from installation to installation. The basic solution remained the same for all sites, but the concept was refined to take into account new technology or design solutions found to be more effective or not available at the time of earlier implementations. The following section will summarize the key differences in the system in terms of the planning process, design, and technology for each of the SMART sites (for detailed case studies of each site, please refer to Appendix A). The final section, "Analysis of Implementation," then discusses some of the effects that these differences in implementation process had on worker satisfaction and performance.

Summary of SMART Installations Across Time

Methodology

In order to compare SMART across all of the installations studied for this report, the IWSP research team constructed planning, design, and technology profiles made up of key aspects of the workplace system. These key aspects combined things that actually occurred at one or more of the sites, such as the provision of laptops, as well as factors that the IWSP has found generally to be important in the implementation of non-territorial offices based on our past research. Some examples of such factors are: project ownership by the departments involved; individual data collection through surveys and interviews with each site; and collaboration among different departments such as MIS, Human Resources, and Facilities Management.

The Planning Process

The six major areas identified as important in the process of planning new office environments[8] included: project ownership by the business/

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[8] Becker, F., Sims, W., & Davis, B. (1991). Managing space efficiently: Final summary report. New York: Cornell University International Facility Management Program, NYS College of Human Ecology.

department/group involved; site specific collection of data on work time-activity patterns; collaborative, cross-departmental involvement in the project; the degree to which the end users were involved in the project; the method of informing or involving users in the planning process; and the training provided. These six areas were then broken down into more detailed components and compared across each SMART implementation.

Figure 21: IBM SMART Planning Process summarizes our findings for each site and describes which aspects of the planning process were included for each site. The sites are listed in order of implementation, from the earliest (Glasgow) to the most recent (Warwick II).

The planning process tended to be fairly similar across all of the SMART implementations. There were, however, some variations from site to site. As the concept spread to more IBM sites, less emphasis was placed on certain stages in the implementation process (e.g., the reassessment of work processes, changes in business practice to support the new way of working, development of site-specific alternative workplace strategies). In general, the planning process followed this type of pattern:

- The business was faced with a choice involving a move to another (typically less desirable) site with no reduction in office space, versus staying at the current location and reducing space; or the business was informed by Real Estate that they were to stay in the same location, but would have to reduce space by any means available.

- The business then sought out or was approached by the Country SMART Program representatives (see *Implementation Process Background*). A Country SMART representative presented the SMART concept of unassigned workspaces, and then helped establish project teams, such as user representative groups and technology teams.

- The SMART blueprint defined the technology and applications the business would receive. The SMART team, along with the user group, determined how many SMART workstations it would need and who in the business should be static or mobile, based on the information gathered from the UK surveys (see *Implementation Process Background*). The SMART team and user group also determined the layout of the permanently assigned desks, and scheduled training.

- The business was given the technology and the space.

Figure 21: IBM, UK SMART Planning Process

		Glasgow	South Bank CP&S	Warwick I	South Bank City of London	Bedfont Lakes	Warwick II
Project Ownership:	Departments/Groups/Businesses	●	●	●	●	○	○
Groups/Teams/Committees:	SMART team	●	●	●	●	●	●
	User Representatives (non-managers)	●	●	●	●	○	○
	Managers	●	●	●	●	●	●
	Other	○	○	○	●	○	○
Collaborative Team Project:	Departments/Groups/Businesses	●	●	●	●	○	○
	Facilities/Premises Management	●	●	○	●	●	●
	Space Planning Consultants	●	●	○	○	▨	○
	Management Information Systems	●	●	○	●	○	○
	Human Resources	●	●	○	●	○	○
Data Collection:	Occupancy Patterns for Group/Site	○	○	○	○	▨	○
	Needs Analysis for Group/Site: Space	○	○	●	○	○	○
	Technology	●	●	●	○	○	○
Method of Informing or Involving End-Users (non-managers):	Workshops	○	○	○	○	○	○
	Seminars	○	○	○	○	○	○
	User meetings	●	●	●	●	○	○
	Bulletins/Newsletters	●	●	●	●	●	●
Training:	SMART/Technology	○	○	○	●	●	●

○ Did not have
● Did have
▨ Occurred post-implementation

Project Ownership

IWSP research has shown that projects "owned" by the business or department tend to be more accepted than projects where an outside entity owns the project, such as Real Estate or Facilities Management.[9] All of the early, small implementations of SMART (see Figure 21) were perceived as being owned by the businesses in question. Bedfont Lakes and Warwick II, however, were owned by the SMART team and Corporate Real Estate. The business unit occupying the space had very little to no influence over the planning of the project.

Project Teams/Committees Established

All of the sites had the benefit of the Country SMART representatives and their experience with SMART implementation across different sites. All of the sites established some form of user representative group as well, but with varying degrees of involvement depending mostly on the size of the project. The larger the scale of implementation in number of employees, the less comprehensive the user groups tended to be. In the smaller projects, for example, many of the end users served on a user group or committee. However, in the case of the largest site, Bedfont Lakes, users below the level of manager were not included in the planning process.

Collaborative Team Effort

Again, the earlier project sites tended to be very collaborative, including people from Management Information Systems (MIS) and Human Resources (HR), as well as Facilities and the business unit. As SMART became more standardized, MIS and HR had less input in the project. An exception to this trend, however, was the first project implemented at the Warwick site. This project was not originally scheduled for SMART. The group itself decided to implement the program to keep from moving. While they did have the help of the SMART representatives, there was very little planning done in terms of space and technology, and few people from other areas such as HR and MIS were involved in the project.

Data Collection

All of the sites had the benefit of the information gathered across the UK

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[9] Becker, F., Sims, W., & Davis, B. (1991). Managing space efficiently: Final summary report. New York: Cornell University International Facility Management Program, NYS College of Human Ecology.

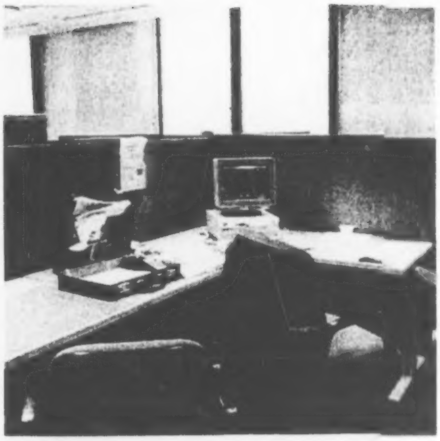


Photo 2: Typical Workstation at IBM

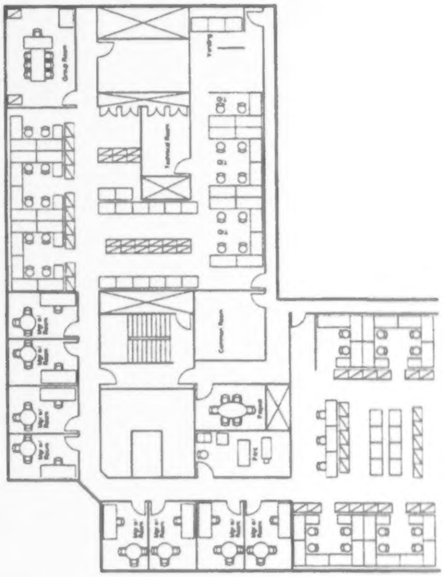


Figure 22: IBM Bedfont Floorplan

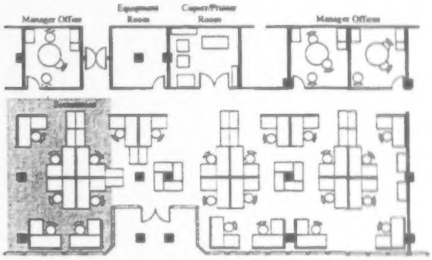


Figure 23: IBM South Bank Floorplan

in the four studies by the outside consultant, but very few actually interviewed/surveyed their users independently to determine if this data was appropriate for their individual departments. While many of the smaller sites collected data from staff, interviews focused primarily on the technology needs, ignoring the occupancy patterns of the employees. All of the sites relied on the standards set by the earlier studies (i.e., 7:10 desk:employee ratios for consultants and sales people).

End User Involvement

Most of the earlier sites placed a good deal of emphasis on directly involving the users. As with the formation of project teams, user involvement tapered off as the projects became larger in scale and more standardized. Bedfont Lakes and Warwick II had little to no user involvement (see Figure 21).

Training

General training for users became standard practice in the later implementations (i.e., after City of London). Training usually amounted to one day of workshop/seminar style sessions on SMART (description and basic rules), the laptop technology, and the telephone system.

Summary of Planning Process Across Time

To summarize some of the changes in implementation over time:

- Businesses/departments had less ownership of the SMART project over time. In larger installations, it was felt that there were too many departments involved to give ownership to the individuals.
- The SMART project became less collaborative over time. As the installations progressed, fewer people from other fields (Human Resources, Information Systems, Facility Management, Space Planning Consultants) were consulted on the project.
- As the project became more standardized, fewer users were involved in the planning and design stage of the project. Users were limited to informational meetings after the plans had already been established.
- As the project became more standardized, less site-specific data collection took place. Planners relied on the ratios established in a UK-wide survey and did not look at individual site work/occupancy patterns.

Design

The major goal of the design of a working environment should be to support the ways in which people work in the environment. For non-territorial offices, our experience has indicated that some of the major attributes that help users work more effectively include:

- Multiple forms of work areas to support different tasks performed in the office, such as concentrative work, team projects, small meetings, etc.
- Adequate storage for both personal and work related materials.
- Flexibility in the design to handle peak periods and growth in the department (both temporary and permanent).
- Common areas for meetings (both formal and informal) and break-out areas for relaxation.
- Surroundings that encourage communication, collaboration, and exchange of ideas without negatively impacting the productivity of the group.

Figure 25: IBM, UK SMART Design describes some of the physical attributes of the SMART projects: what types or workstations were available at each site; what storage alternatives were provided; what common areas were included in each design. The physical design of the non-territorial offices was done in such a way that the physical surroundings did not differ tremendously from what workers were using initially; the workstations and work areas were basically unchanged (see Photo 2).

The main difference was that workers were not assigned a specific workstation; they could use any designated SMART workstation that was not occupied when they came into the office.

As the floor plans for the Glasgow, South Bank, and Bedfont Lakes (Figures 22-24) projects indicate, many similarities existed from installation to installation. The users were provided with L-shaped primary workstations at all sites, centrally located group storage, and personal storage areas. South Bank offered no additional types of work areas or rooms for the employees. Glasgow, however, had two team rooms/customer rooms, as well as a quiet room and vending area. Bedfont Lakes went beyond either of these two installations, providing group rooms, project rooms,

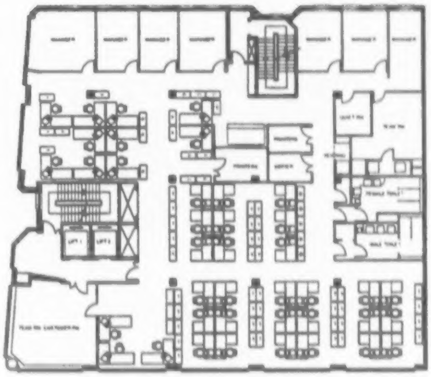


Figure 24: IBM Glasgow Floorplan

Photo 3: IBM Touchdown Workstations

Photo 4: IBM Visitor Workstations

Figure 25: IBM, UK SMART Design

		Glasgow	South Bank CP&S	Warwick I	South Bank City of London	Bedfont Lakes	Warwick II
Multiple Workstations:	Primary workstations	●	●	●	●	●	●
	Touch down workstations	○	○	○	○	●	●
	Work rooms/Quiet rooms	●	○	○	●	●	○
	Manager office accessible if unoccupied	●	●	●	●	●	●
	Dedicated visitor workstations (dept.)	○	○	○	▨	●	●
	Dedicated visitor terminals (location)	○	○	○	○	●	●
Storage Alternatives:	Portable file carrier	●	●	●	●	●	●
	New personal storage cupboards	○	○	○	▨	●	●
	Standard 5' storage cupboards (or equivalent)	○	○	○	○	●	●
	Central storage areas	●	●	●	●	●	●
Common Areas:	Conference rooms	●	○	○	●	●	●
	Break-out areas	●	○	○	○	●	○
Design Considerations:	Low panels	○	○	○	○	●	●
	New furniture	○	○	○	○	●	○

○ Did not have

● Did have

▨ Occurred post-implementation

work rooms, common rooms, and vending areas. These variations and others are highlighted in the sections below.

Multiple Workstations

All sites provided the standard L-shaped primary workstation (see Photo 2: Typical Workstation at IBM). Users who had to perform tasks that required more than just a few hours could do so at one of these workstations.

At Bedfont (and to a lesser degree City of London and Warwick II), SMART users who were only going to be in the office for only a short period of time could use a smaller "touchdown" area (see Appendix A). Touchdown areas were equipped with a terminal or communications cartridge to link laptop computers. This workstation was somewhat smaller than that of the primary workstation (refer to Photo 3).

Only a few of the sites provided designated workrooms or quiet rooms (Bedfont Lakes, City of London, Glasgow), but most of the sites allowed employees to use unoccupied manager offices for confidential or concentrative work.

Most earlier sites were not equipped with visitor workstations. However, visitor workstations were added as a standard to the later installations (after City of London).

Common Areas

Bedfont Lakes included one other area that was new to the SMART system, called a common room. The common rooms were informal areas with magazine racks, tables, and chairs that gave employees the chance to conduct informal meetings away from the workstations.

A few of the installations had break-out or vending areas located near the office area (see Photo 5).

Storage Alternatives

In general, the available storage tended to be less than users had in their previous office environments. With the exception of Warwick II and Bedfont Lakes, users retained the standard 5-foot storage cabinets they had before SMART (see Photo 6), but were limited to a single cabinet

Photo 5: IBM Informal Seating

Photo 6: Typical Storage

Photo 7: New Storage and File Box

Figure 26: IBM, UK SMART Technology

		Glasgow	South Bank CP&S	Warwick I	South Bank City of London	Bedfont Lakes	Warwick II
Office Technology:	Increased access to latest PC	●	●	○	●	●	●
	Docking stations to link portables	○	○	○	●	●	●
	Access to printer, fax, modem	●	●	●	●	●	●
	Electronic diary/mail	●	●	●	●	●	●
Non-Office Technology:	Latest PC terminal	○	●	●	●	○	○
	Latest portable computer	○	○	●	●	●	●
	Home printer	○	○	○	○	●	●
	Modem	○	○	○	●	●	●
Voice Communications/ Telephone System:	Direct dialing number	○	▨	▨	▨	●	●
	Voice mail/messaging	○	▨	▨	▨	●	●
Special Technology Available to Users†:	Customer site terminals	●	●	●	●	●	●
	Car telephones	●	●	●	●	●	●
	Fax machine	●	●	●	●	●	●

○ Did not have
● Did have
▨ Occurred post-implementation

† Equipment not part of standard technology package. Available if user can justify the necessity.

instead of two or more. Location-based users had pedestal file storage and desk storage, in addition to the cabinets.

Bedfont Lakes users had a new storage unit designed specifically for Bedfont using specifications from an IBM storage study, as well as file boxes (see Photo 7). IBM provided Warwick II users with ceiling-high storage cabinets for personal work that was shared between two users.

In addition, Bedfont Lakes users were provided with a new floor-to-ceiling, double-sided, single-entry common storage cabinet (see Photo 8). Many of the other locations had the large horizontal circulating storage bins.

Photo 8: Tall Storage

Photo 9: Example of Technology

Design Considerations

Bedfont Lakes and Warwick II used lower screens between workstations to enable users to locate peer workers visually. Earlier implementations, however, employed higher screens (City of London), which made visual contact more difficult.

Summary of Design Across Time

As the use of SMART became more widespread and users were able to provide feedback, design considerations began to evolve. Designers added spaces that were meant to support more flexible working and the ways in which employees used the central office, including quiet rooms, project rooms, and informal meeting areas.

Technology

The three areas of technology that our survey data showed to be important to the implementation of non-territorial offices included: technology available in the office; technology to support work outside of the office; and technology to support communication. Figure 26: IBM, UK SMART Technology depicts the technology IBM employed at each of the SMART sites.

Computers

Although the technology package was fairly standard for the installations, it did change slightly as technology improved or as the use of certain equipment proved essential. For example, previous to the Warwick installation, SMART users were equipped with a PC terminal at home, restricting computer work to the office or the home. Warwick introduced the notion of portable technology with the provision of "luggable" computers (older, portable computers that were much heavier than current laptops), a concept that greatly increased work flexibility. Installations since that time have supplanted the home terminal as a standard component of the technology package, replacing it with the latest portable technology (e.g., laptops, printers, etc.).

Several sites did not have enough portable technology to give all of the SMART users their own equipment. At City of London, for example, the available laptops were pooled for the department, and could be checked out by individual users for a period of three days or less.

Warwick II also pooled some of its equipment. Two business groups were not given enough printers for all users. In addition, this site did not have enough laptop computers for all users. Some users were originally set up with the antiquated "luggable" portable computers until laptops became available.

Voice Communications

Telephones

In most of the early implementations, SMART users logged the telephone number for the workstation on their electronic diaries. Calls came to main reception, and then were transferred to the user's workstation. After a certain number of rings, the telephone call would roll back to reception. The system did not offer any electronic message service; messages were either taken by main reception, or by anyone who happened to answer the telephone at the workstation.

Bedfont Lakes introduced a new telephone system in which each user was given an individual direct dial number. This number followed the user from workstation to workstation. Upon reaching the desired workstation, the employee logged the direct dial number into the system, after which all calls were directly routed to that location without having to go through main reception. At the time of this report, this system was only operational within a given site; the number did not follow the user between locations. If the user worked at another site or at home, voice-mail answered all calls, from which the user could easily retrieve all messages. The goal, however, is to have the direct dial number work from site to site.

The new telephone system provided many new services, such as transferring caller telephone privileges (e.g., international service) to whatever telephone the user logged onto, instead of compelling the user to track down a telephone offering certain services. Voice mail/electronic messaging was also a standard component of the telephone system.

An example of a nonstandard telephone solution occurred at the Warwick I. Two telephones were placed on each of the shared desks, each with a separate number. Calls were then answered by whatever user was sitting at or near the desk at the time.

Electronic Diaries

Electronic diaries were a standard feature at all of the IBM sites. This diary was set up for each employee on the network. Employees were required to keep their electronic diaries up-to-date at all times. If someone wanted to meet with another employee, he/she needed only to look up the other person's diary to see where and when that person was available. Immediately upon logging onto a computer, the diary was automatically updated to show which site the employee was working in at the time.

Several different methods of tracking people while they were in the office have been tried at IBM. The City of London used a white board on which people were supposed to record the location of their workstation. For many of the sites, the electronic diaries were the most effective means of tracking people down at specific workstations. At Warwick II, the workstations were labeled with a specific number, and this number was entered in the diary.

Special Technology

Some users were issued car telephones and fax machines, or had terminals installed at customer sites, but this equipment was not issued as a part of the standard SMART package. If the user could justify the equipment to his/her immediate manager, then the equipment was issued.

Summary of Technology Over Time

As technology advanced and the necessity of certain types of portable technology became evident, the technology package associated with SMART grew more sophisticated (i.e., had more components, was more compact, had more features and greater capacity). The package also became more standardized, with components issued to users regardless of need.

Employee Satisfaction and Work Effectiveness

This section presents some of the results of the interviews and surveys conducted by the IWSP at IBM, and discusses the user work effectiveness and satisfaction ratings in relation to the changes in the office system and implementation process.

Survey Background Data

User Profile

Job types of all the employees surveyed and interviewed fell into the following categories:

- consultants;
- managers;
- sales;
- systems consultants;
- systems engineers;
- others.

The largest group of respondents (43%) were system consultants or other consultants. Managers and sales people constituted the next largest groups of users surveyed, with 21% and 17% of users falling in these two categories, respectively (see Figure 28). The survey ratings tended to be rated the same by all job types in IBM.

Table 16: Data Collection for IBM

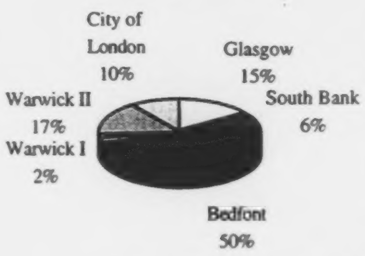
	Total Number Conducted	Total Number of Locations
Cornell Workspace Survey	410	6
Focus Groups	7	4
Interviews	43	6
Personal Observation	—	6

The users were fairly evenly distributed across age groups, with the exception of employees over the age of 50 (see Figure 29). When the survey data was examined by age group, there were statistically significant differences for certain age groups. In general, issues tended to be rated higher by younger age groups than by older age groups. For example, the overall satisfaction with SMART tended to be higher for employees age 26-30 than for employees age 31-35, 41-45, and 46-50 (t=2.243, df= 149, p= .0263; t= 2.298, df= 128, p= .0232; t= 2.948, df= 145, p= .0037), with means of 3.4, 3.0, 3.0, and 2.9, respectively. Work effectiveness and satisfaction with the technology was also higher for younger age groups. For example, respondents in the 26-30 age bracket rated their satisfaction higher than respondents in the 46-50 age bracket (t= 3.311, df= 146, p= 0.0012), with means of 4.0 and 3.5, respectively. All other issues tended to be rated about the same by all age groups.

Eighty-five percent of the users surveyed had worked in a SMART office from 1 to 6 months. The satisfaction means for employees who had worked longer than 1 to 6 months were approximately the same as those working from 1 to 6 months, when the differences in sample size were taken into consideration.

Previous to SMART, 13% had individually enclosed offices, 61% had individual workstations with either low or high panels, and the remainder had either an individual desk, shared office, or some other form of office arrangement. Two indices showed statistically significant differences in the means when the data was examined across the previous workstation: work effectiveness and privacy. People who had previously been working in shared-assigned offices rated their satisfaction with work effectiveness issues lower than those in individual work stations with high panels and those assigned to individual desks without panels (t= 2.400, df= 189, p= 0.0173 and t= 2.350, df= 84, p= 0.0211), with means of 2.2, 2.5, and 2.5, respectively. In terms of privacy, people who had previously been working in individually assigned workstations with high panels rated their satisfaction with privacy in the SMART environment higher than people in other types of settings. For example, the privacy mean for individually assigned workstations was 2.5 compared, to 1.9 for those in shared-assigned offices (t= 3.726, df= 139, p= 0.0003).

Figure 27: Percent of Surveys by SMART Location†



†Total of 410 IBM surveys returned.

Figure 28: Survey Respondents by Job Type

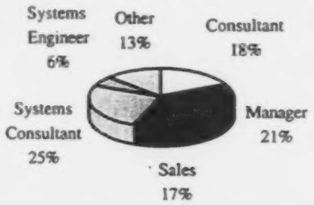
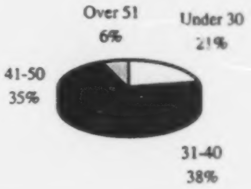


Figure 29: Surveys by Age Group



For more information on the survey and the rating system for the responses, please see *Data Collection Methods* in the *Methodology* section. A complete survey can be found in Appendix D.

Benefits of SMART

The three biggest benefits that users attributed to working with the SMART office system at all sites were:

1) **Flexibility**: Users liked the idea that they could work at locations other than the office, and could work at different locations within the office.

2) **Ability to work at home:** Many users felt more productive working at home (amount of work accomplished was higher at home, quality was better). Also, users felt that they were able to spend more time with their families and spent less time traveling.

3) **Access to latest technology:** Previous to SMART, users did not have as much access to PS/2 technology or laptops. The trade-off of space for technology allowed the users to have technology that they otherwise might not. Users commented that in addition to being able to work from other locations with the new technology, their presentations to clients were much improved with the laptop technology.

Disadvantages of SMART

The three biggest disadvantages/areas of improvement that users targeted were:

1) **Voice and data communications from home:** Users stated that transmitting data from home to the mainframe and vice versa was too slow/much slower than at the office. They also mentioned that unless they had an additional telephone line in their homes, they could not communicate with the office if they were working with the modems on the laptops.

2) **Noise/distractions in the office:** This was a common complaint at all of the SMART locations. People associated the noise with the added traffic through the SMART areas, attributable largely to people looking for workstations and traveling in and out of the office. The increase in noise could also be a result of changing work patterns: users in many of the focus groups stated that they saved their telephone calls, team projects, and less intensive work for the office. In addition, users in the office used this time to work/socialize with coworkers.

3) **Storage space for work-related materials:** The space allocated to SMART users tended to be less than they had previously, so this low response was expected.

Issues of Most Importance to SMART Users

In addition to rating their satisfaction with a number of issues related to the work environment, the survey also asked users to rate how important these issues were to them. On average, the ten issues that were most important to all users were:

- ease of concentration in the office;
- ease of receiving telephone messages;
- ease of receiving telephone calls in workspace;
- quality of work done in the office;
- access to NOSS & UMIS (IBM network) away from the office;
- amount of work done at the office;
- ease of making telephone calls in the office;
- quality of work done at home;
- auditory privacy at the office;
- ease of concentration at home.

Issues of Least Importance to SMART Users

The three least important issues among SMART users were:

- display of personal items;
- availability of informal break areas;
- storage of personal items.

It is important to note that user satisfaction/dissatisfaction did not tend to influence the importance ratings for an issue. The scattergram of satisfaction ratings compared to importance ratings (below) demonstrates that ratings were relatively even across all quadrants;[10] a low satisfaction issue was no more likely to be rated of high importance than a high satisfaction issue. If data points were nonexistent in the low satisfaction-low importance quadrant, then one could assume that satisfaction/dissatisfaction may have influenced the importance that users placed on certain issues. This did not appear to be the case with the IBM SMART respondents. For example, the comparison satisfaction rating for the opportunity to display personal items in the SMART environment versus the previous office environment was very low—only 1.41, the lowest satisfaction rating for all of the issues. The importance rating, however, was also low with 2.90 (one of the lowest importance ratings).

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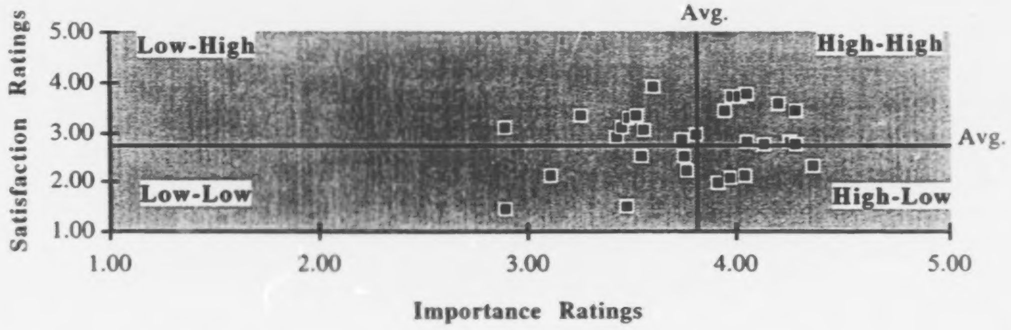
[10] Note: The importance of issues relating to the environment tended to be rated fairly high in the Workplace Surveys. For example, one of the lowest importance ratings was around 2.8. This was due in part to the limitations of the rating scale in the survey. The quadrants have been divided at the importance and satisfaction means (versus at the median score of 3.0) to help clarify which issues were of most importance to the users.

Figure 30: Satisfaction Ratings Compared to Importance Ratings



Issues of High Importance and High Satisfaction

Referring to the above scattergram, issues of high importance and high satisfaction included:

- quality of work at home;
- access to the network from home;
- ability to concentrate at home;
- ability to receive messages;
- amount of work accomplished at home;
- the ability to handle text/mail from home;
- the ability to receive mail as a result of the new office system

Issues of High Importance and Low Satisfaction

Issues of high importance and low satisfaction included:

- ability to concentrate in the new office environment;
- storage for work-related materials;
- access to files/reference materials;
- auditory privacy in the office.

Issue Indexes

In order to more clearly demonstrate the changes in user satisfaction from project to project, the ten most important survey issues to users have been grouped into seven major categories. These categories were:

- work effectiveness;
- communication;
- technology;
- home;
- privacy;
- storage/personalization;
- alternative spaces/design.

The user satisfaction ratings for issues falling under these categories were then graphed for each site (e.g., quality and amount of work accomplished in the office—*issues*— were grouped under the category "Work Effectiveness"). A mean score, or "index," of all of the issues in a particular category was also graphed for each site.

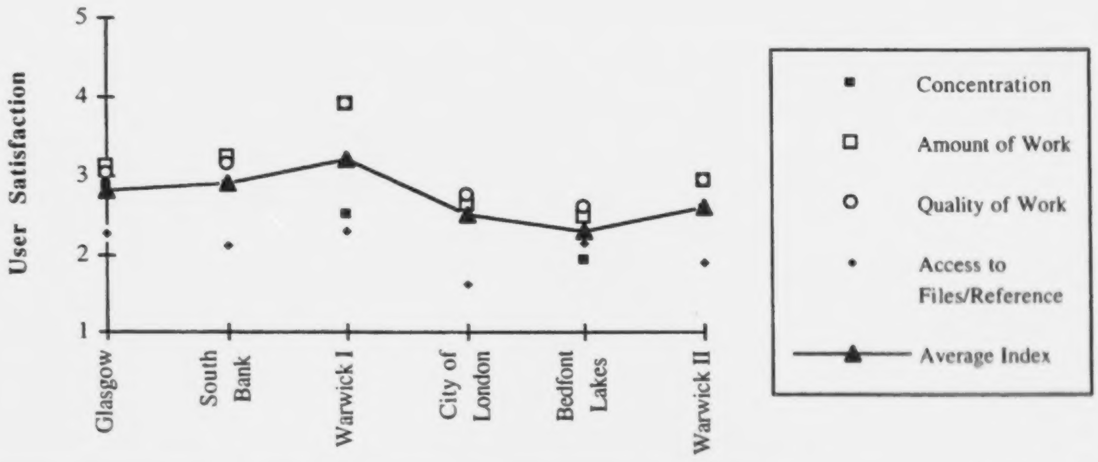
When appropriate, certain issues were listed under more than one category. For example, "User satisfaction with the access to NOSS/UMIS from home or outside the office" falls under both the Technology Index and the Home Index. In addition, other issues not among the ten issues of greatest importance were added to the index when appropriate to help clarify advantages/disadvantages of the system.

Work Effectiveness Issues

The four issues grouped under work effectiveness were: ease of concentration in the office; quality of work done in the office; amount of work done in the office; and access to files and reference materials.

Work effectiveness issues tended to be rated from "the same" to "somewhat worse" in the SMART environment compared to the previous office system (see Figure 31: Work Effectiveness Index). The two issues that consistently were rated much lower by the users were the ability to concentrate in the office and access to files and reference materials. Respectively, 56.5% and 68.2% of all SMART users rated these issues as worse than what they had before SMART (see Figures 32, 33 on page 91).

Figure 31: Work Effectiveness Index



Ability to Concentrate in the Office

The installation of SMART forced users in many of the locations to work in a much more open environment. Increased traffic from people looking for an available workstation (both visitors and location-based SMART users), the flexible work patterns of SMART users, and the nature of the work performed in the office all contributed to the noise/distraction level in the offices.

SMART users were no longer bound by location and working hours, so traffic into and out of the office was continuous throughout the day. In addition, many people "saved" the more interactive (and "noisier") tasks (telephone calls, team projects, meetings, etc.) for the office. While much of their concentrative work could be—and was—performed at home, the noise level in the office made it more difficult to perform tasks such as telephone calls, small meetings, and discussions without interference from other employees' activities.

Access to Files and Reference Materials

With SMART, users no longer had storage associated with a particular workstation. Storage was usually in the form of a centrally located storage cupboard. Users felt they wasted a lot of time walking back and forth from the workstation to their storage facility. Users often had to walk to their cupboard to retrieve needed files while on the telephone with a client. Office overcrowding in some locations forced users to work across the department from their cupboard, because all of the closer workstations were occupied. Bedfont tried to help alleviate this problem by providing portable files, thus enabling users to carry the bulk of their files with them. Users stated that this system did not work because it was difficult to know what files would be needed for the day, and inconve-

Figure 32: Frequency Distribution for Ease of Concentration in SMART Across All IBM Sites

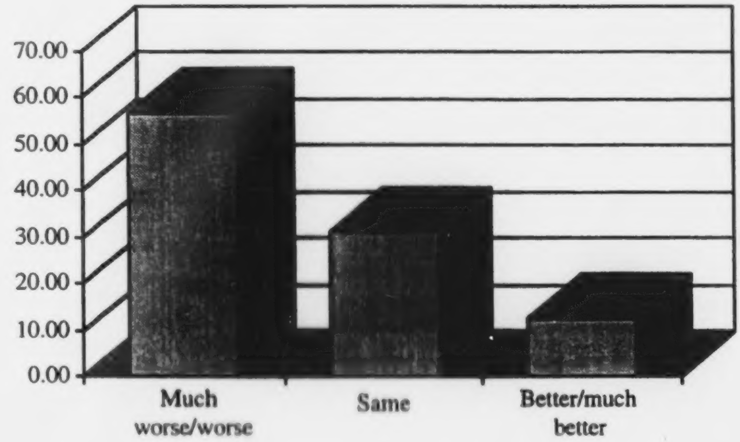
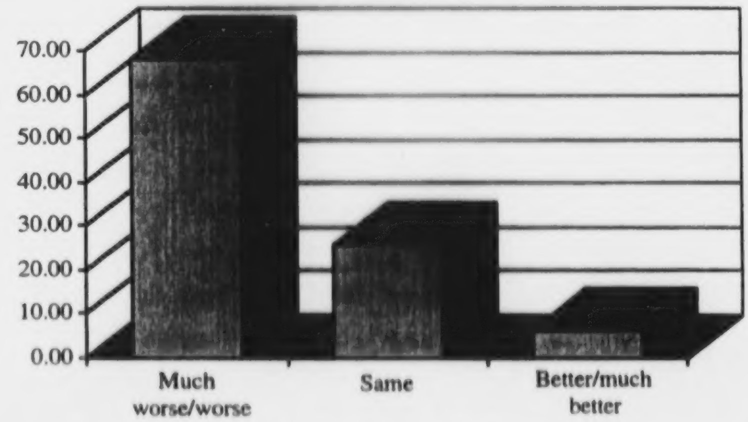


Figure 33: Frequency Distribution for Ease of Access to Files/References in SMART Across All IBM Sites



nient to carry the box around. According to SMART users, without files readily accessible, simple tasks often required twice as much time to complete.

Amount and Quality of Work Performed in the Office

The ratings for the amount and quality of work performed in the office varied from site to site. One would expect these ratings to be the same to slightly higher than the previous office system, because the added technology and work areas (at some of the sites). For the earlier installations, this prediction held true. In the later installations, however, this was not the case. This finding will be discussed in greater detail in the following section, but in general we believe that the larger numbers of people, the inability to concentrate in the office, and other issues specific to the sites significantly effected the users' ability to perform work in the office.

Comparison Across Installation Sites for Work Effectiveness

Work effectiveness issues were rated much higher in the earlier installations, peaking at the Warwick I location before dropping off at City of London (see Figure 31: Work Effectiveness Index). Some of the decrease in the overall work effectiveness scores can be attributed to the sheer numbers involved in the SMART implementations; the later installations had more people working in SMART areas than did the earlier implementations. With large numbers of people working in the SMART environment, the noise level was much higher than in an office accommodating only 24 users, such as South Bank. Noise inhibited people's ability to concentrate, and thus get work accomplished.

The City of London

City of London users were in a unique location and had additional work effectiveness concerns compared to the other sites. The City of London users had work patterns dissimilar to users at other sites due to the proximity of their clients. Users mentioned that most, if not all, of their customers were located within twenty minutes of the office. Users generally were not away from the office for extended periods of time. Users would attend meetings with their clients and then return to the office, rarely using other IBM facilities or home as alternative work sites. Because all of their clients were in close proximity, more people were in the office at any given time. The City of London users also had the disadvantage of being located near the executive offices of IBM; consequently, they had many visitors to the department who would often chose the City of London SMART area as a workplace. This heavy traffic, and the noise and disruption associated with it, may have played a substantial role in the low satisfaction ratings.

City of London users also tended not to use the portable technology provided by SMART. City of London users stated that very few people used the laptops in their department for two reasons: not only were the pooled laptops difficult to find, but most of the users' work patterns did not require flexible technology. They performed the majority of their work in the office (versus at home, at the clients', or occasionally in other IBM locations). If a task needed to be completed immediately, it was not difficult for them to get back to the office and work on the available technology. The standard ratios used to set up the City of London SMART environment were not established to support these work patterns, so users often had to spend time that could have been spent working in search of an available workstation.

Bedfont Lakes

Bedfont Lakes' remote location also inhibited many users from taking advantage of the mobile technology. Because it was so far out of the way, users and visitors tended to work at Bedfont in large increments of time, such as a day or half-day, versus short infrequent trips into the office. Again, the standard ratios did not take into account these nonstandard work patterns. The result was that many people were in the office at any given time, and users had to look for an available workstation.

The lower work effectiveness ratings at Bedfont could also be explained by problems in assimilating new technology. Users complained that the help desk did not really help them to understand the new equipment and software, and that the telephones did not work properly when they first moved in. They thought they would be more productive in the long run, but they currently did not feel very productive, because they could not yet use the technology as it was meant to be used.

Warwick II

SMART users at the Warwick II location rated the work effectiveness issues slightly higher than users at City of London and Bedfont Lakes, but nonetheless lower than earlier implementations. The Warwick II users experienced some of the same problems as the Bedfont users understanding the new technology; Warwick II had problems with the telephones, and users also complained of not being able to use the technology as intended.

Communication Issues

The four issues that were included in the communication category were: ease of making telephone calls in the office, ease of receiving telephone calls, ease of receiving messages, and ease of receiving mail.

In past experience, the ability to handle telephone calls and messages was a common and pressing problem in flexible offices. IBM initially solved this problem by having a central reception area in each department that handled telephones and mail. Calls would be transferred by reception to the appropriate workstation, and mail/messages would be typed into the electronic system.

IBM recently replaced this system with an electronic messaging system beginning with the Bedfont Lakes location. Calls were routed directly to the user when they logged onto the telephone system using a direct dialing number. Messages could be recorded on voice-mail. Users could now access their messages by calling their "accounts."

With the introduction of this new system, user satisfaction increased substantially (see Figure 34: Communication Index). Users stated that they were able to receive telephone calls and messages wherever they were, and that this was a big benefit to them. Since being introduced at Bedfont, the telephone system has been installed at many of the precursory SMART installations.

The overall satisfaction ratings with respect to communication at Warwick II showed that users were still happy about the new telephone system by the time it was installed at this location, but that the "excitement" level may have decreased since its introduction. Users noted some drawbacks to the new system that did not arise at Bedfont Lakes:

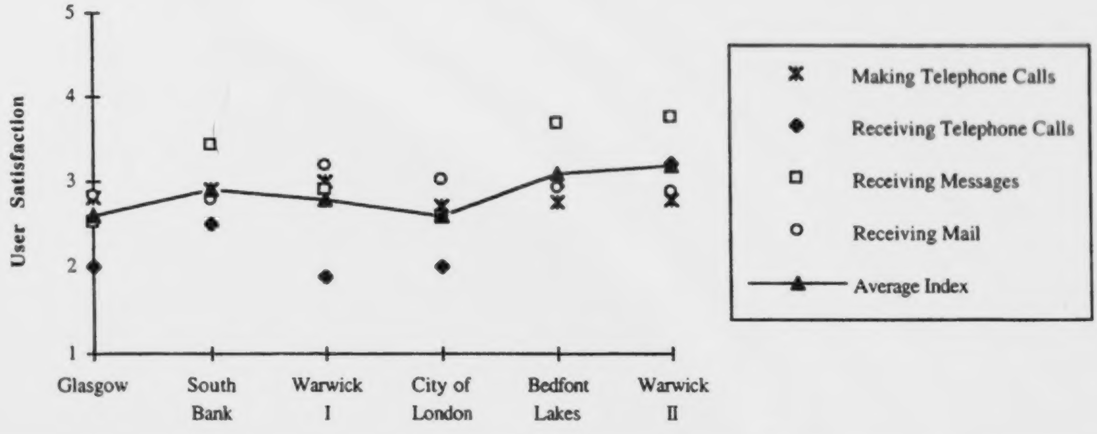
- The telephone system was not linked between IBM locations, so users could not log onto the system from another location. While IBM is still working on making this feature available, Warwick II users expected it to be available by the time the system was installed at their location.

- IBM has reduced the number of secretarial staff because of the telephone system as well as for financial issues. Warwick II users received many complaints from clients that they missed the human factor.

- The Warwick II site experienced many problems with the system early in its implementation that made the system unpopular, such as messages being lost or randomly erased and/or voice mail not picking up.

- Calls were no longer automatically rerouted to reception after the telephone rang more than three times. If a user forgot to log out of the system when he/she stepped away from the workstation, the telephone kept ringing until someone in the office picked up the line.

Figure 34: Communication Index



Technology Issues

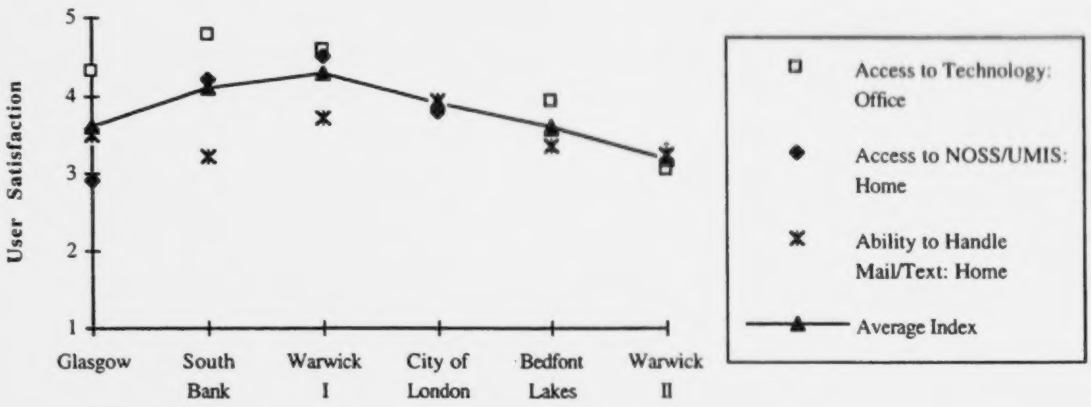
The three issues included in the technology category were: access to technology at the office; access to NOSS/UMIS at home; and ability to handle mail/text at home.

The technology in the SMART environment was rated much higher than in the previous environment. Surprisingly, however, the satisfaction ratings decreased over the course of the project (see Figure 35: Technology Index). We expected the ratings for technology to increase as the technology improved. One possible explanation for this unanticipated trend is that user expectation increased at a faster rate than technology improved. Although the laptops issued to Warwick II and Bedfont users were far more advanced than the "luggables" issued at earlier implementations, the users felt the laptops should have been better. They should have been able to download information to/from the mainframe as quickly as if they were in the office; the laptops should have been in color so that they could make color presentations to the clients; the software platform on the laptops should have been better and more in line with what they were using in the individual departments.

User access to technology was one of the technology issues that was rated fairly high by all users. The frequency distribution shows that over 50% of all respondents rated this issue as "better" or "much better" in the SMART environment compared to the previous environment. Over 80% rated this issue the "same" or "better" (see Figure 36: Frequency Distribution for Access to Technology at Home in SMART Across All IBM Sites).

User ability to handle text/mail from home as a result of the SMART environment was rated on average lower than other technology issues. The frequency distribution, however, indicated that the scores were quite varied in terms of user satisfaction with this issue. Over 75% of all users rated this issue as the same or better in the SMART environment compared to the previous environment, while less than 25% rated it worse (see Figure 37: Frequency Distribution for Ability to Handle Text/Mail at Home in SMART Across All IBM Sites).

Figure 35: Technology Index



Home Issues

The six issues that were grouped under this heading were: quality of work at home, amount of work at home, ease of concentration at home, access to NOSS & UMIS, ability to handle text/mail, and communication with coworkers.

Users across all of the sites rated these issues better than in the old office system, with mean scores between 3.5 and 4.0. As with the technology index, the scores tended to drop off for Bedfont Lakes and Warwick II, even though the technology was much better than at the earlier sites (see Figure 38: Home Index). Users complained that the system was very slow when they were outside of the office and linked via modem. They also complained that they had to use their own telephone lines if they wanted to work at home, and this often interfered with their families' ability to function normally.

Again, user expectation in all likelihood increased at a greater rate than home technology improved.

In terms of users' ability to communicate with coworkers at home, the mean score for each site was one of the lowest in terms of user satisfaction with home issues. The frequency distribution, however, indicates that the scores were fairly evenly distributed across scores for all sites. Forty percent of all users rated their ability to communicate from home as

Figure 36: Frequency Distribution for Access to Technology at Home in SMART Across All Sites

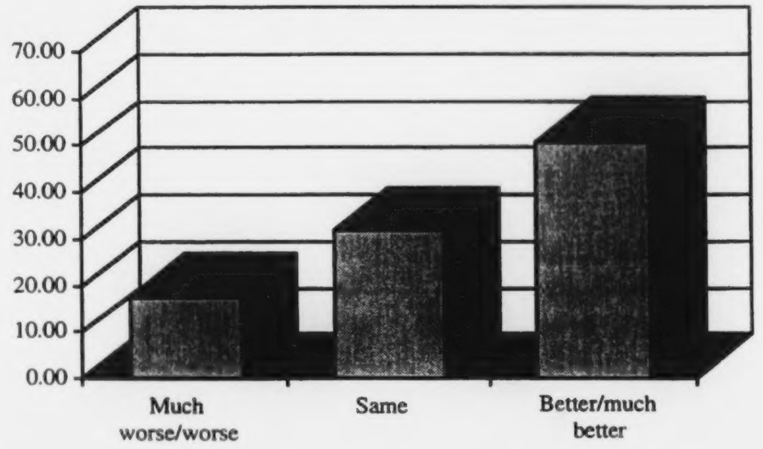
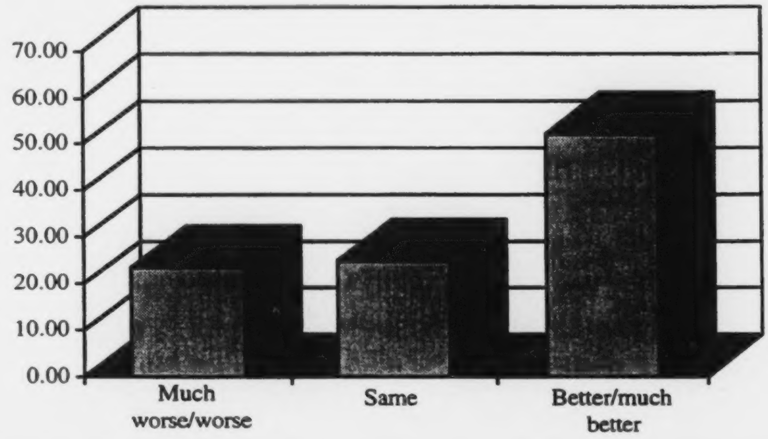


Figure 37: Frequency Distribution for Ability to Handle Text/Mail at Home in SMART Across All Sites



worse or much worse in the SMART environment, while 60% rated it the same or better (see Figure 39: Frequency Distribution for Communication with Coworkers from Home in SMART Across All IBM Sites.

Privacy Issues

The four issues grouped under privacy were: ability to deal with confidential issues in the office, auditory privacy, conversational privacy, and

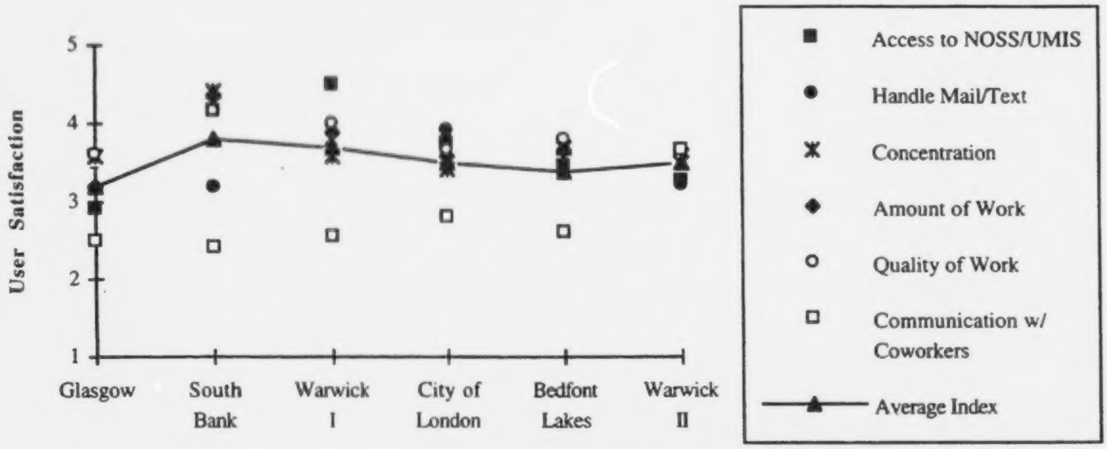


Figure 38: Home Index

visual privacy.

All of the privacy issues were consistently rated the same to worse than in the previous office environment. The ratings for Bedfont Lakes, however, were unusually low compared to the other sites. Some users commented that the design of the Bedfont Building made it particularly difficult to work in in terms of privacy/quiet. All of the workstations had low panels, allowing the noise to reach each workstation. The departments were quite open and bordered by glass on two sides, which did little to alleviate the noise/privacy problems.

Storage/Personalization Issues

The issues included under storage and personalization were: storage for work-related materials; access to files and reference materials; storage for personal items; display of personal items; and display of work-related materials.

All of these issues were rated worse in the SMART environment compared to the previous office system across all of the sites (see Figure 41: Storage/Personalization Index). The concept of SMART did not allow personalization of workstations in any way, so satisfaction with the ability to display personal and work-related materials should be low. As noted earlier in the report, these issues were also rated low in importance by the users of SMART.

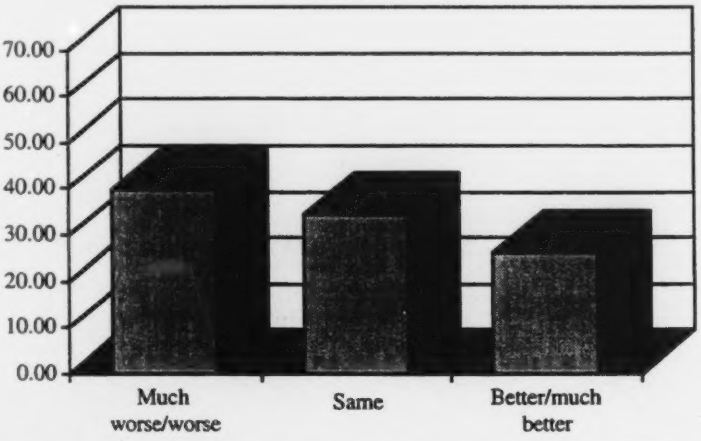


Figure 39: Frequency Distribution for Communication with Coworkers at Home in SMART Across All Sites

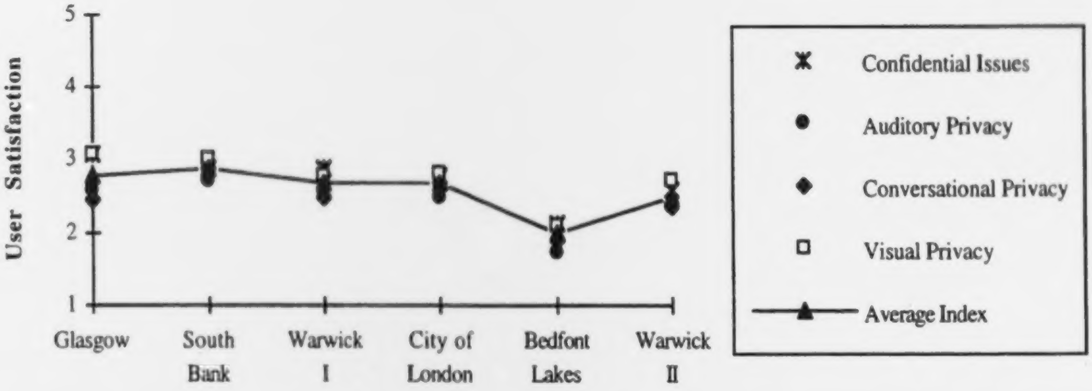
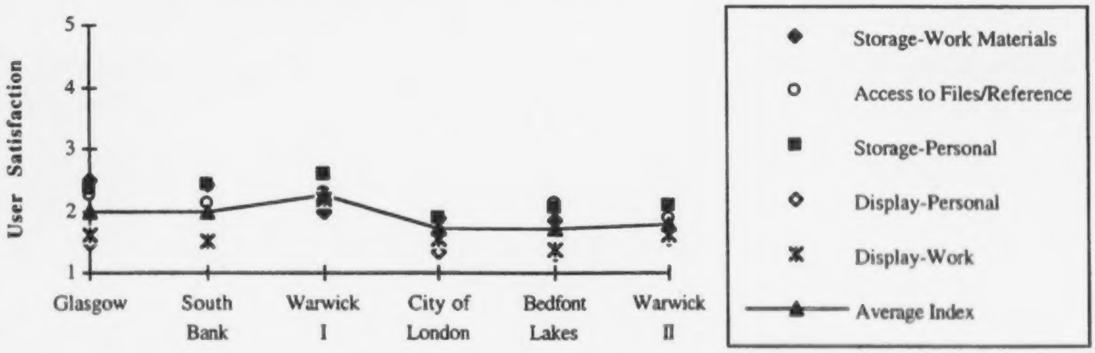


Figure 40: Privacy Index

Both storage and access to files and reference materials were rated low across all sites, but were rated high in importance. Storage in the majority of locations was less than users were accustomed to, so some dissatisfaction was expected. Many users, however, complained that they were not actually able to reduce their storage requirements, and now had to store materials at home. Storing materials at home not only impinged on their home life, but also forced users to carry materials back and forth from the office, as well as possibly resulting in extra trips due to needed materials being left in the wrong location.

Figure 41: Storage/Personalization Index



Alternative Space/Design Issues

The issues grouped under this category included: informal meeting areas, informal break areas, dedicated project or team rooms, resource centers, and number and location of conference areas. In addition, satisfaction with access to files and references was included in the combined index.

The design of the SMART environment in the first implementation at Glasgow offered users a wide variety of workspaces, several storage alternatives, conference rooms, and break-out areas. The next two implementations (South Bank CP&S and Warwick I), however, offered employees very little choice in where they worked; essentially, they could work either at primary workstations or in unoccupied manager offices.

The design became more diverse with the City of London implementation, which provided users with dedicated project rooms or quiet rooms, visitor workstations, conference rooms, and a variety of storage alternatives. Surprisingly, however, even though the design appeared to improve from City of London to Warwick II, providing new furniture, a variety of different workspaces, informal areas, etc., user satisfaction decreased across these same projects (see Figure 42: Alternative Space/Design Index). The design of the office environment at Bedfont Lakes was much more involved than in any of the previous projects, yet user satisfaction with the design was no higher.

One explanation for this low user satisfaction is that, again, expectations may have increased at a greater rate than design features. Another, more likely, explanation is that the design was not tailored to user needs. For example, interviews with SMART users at Bedfont indicated that users often worked at the site for long periods—either for a full day or for most of the day—because of its remote location. For long periods in the office, users worked at the primary workstations or in team offices. Therefore touchdown workstations, which were figured into the total workstation-employee ratios, were either not being used, or were being used for an unintended purpose. When users could not find an available primary workstation, they were forced to work at the smaller touchdown stations, which were designed primarily for telephone calls and e-mail work.

In addition, users mentioned that, although they were provided with informal break areas called "Common Rooms," they were uncertain how these rooms should be used (whether for informal meetings, relaxation, casual reading, or other functions), and would have preferred an area conference room.

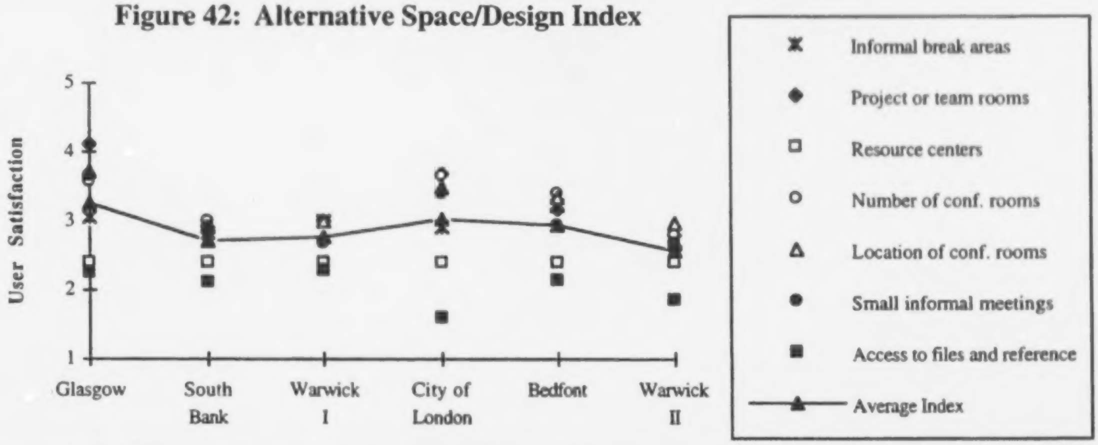


Figure 42: Alternative Space/Design Index

Overall User Satisfaction with the SMART System and The Implementation Process

One of the primary objectives of this study was to observe how changes in the implementation process effected user satisfaction/work effectiveness in the office environment. The trend at IBM throughout the SMART project was to try to standardize as many aspects of the process as possible, particularly with regards to the planning process. However, the SMART concept was refined over time as the project moved from site to site. Again, to summarize some of the changes in the planning and implementation process over time (see *Summary of SMART Installations Across Time* section for more details):

- Businesses/departments had less ownership of the SMART project over time.
- The SMART project became less collaborative over time.
- As the project became more standardized, fewer users were involved in the planning and design stage of the project.
- As the project became more standardized, less site-specific data collection took place.
- As the use of SMART became more widespread, design considerations began to evolve.
- As technology advanced and the necessity of certain types of portable technology became evident, the technology package associated with SMART grew more sophisticated (e.g., had more components, was more compact, had more features and greater capacity).

IWSP "Rating" System for the Implementation Process

Based on the IWSP's experience and knowledge of non-territorial and shared office environments, a rating system was devised to depict the emphasis that each of the organizations—and sites within organizations—placed on the planning, design, and technology during implementation. Using the figures that summarized the components of each organization's implementation process as a guide (see Figures 43, 44, and 45 for examples), the sites were given points on a scale of 0 to 5 for each of the subcategories (e.g., project ownership, non-office technology, multiple workstations) according to: (a) whether the site included/considered the subcategory during implementation, and (b) the quality with which the subcategory was carried out. In this rating system, we often assumed that "more is better:" the more methods a site employed to involve users, the more technology provided for mobile work, the more types of work areas provided to support work patterns, the better.

For example, under the planning process at Bedfont Lakes, a subcategory would be groups/teams/committees involved in planning. The Bedfont Lakes implementation process included the SMART Country Program members, as well as a user representative group; therefore it can be said that Bedfont Lakes did attempt to involve groups in the planning process. The rating for this degree of emphasis was a 3 (out of 5). However, we know from talking to people involved in the user representative group that they had very little input into the design and planning of the project, and that the group's membership was not consistent throughout the process (the numbers varied anywhere from 4 to 12 users). The "3" rating was, therefore, reduced to 2.5 to reflect that although Bedfont Lakes did have a user representative group, its involvement was not strong.

SMART Implementation Process

This expert-based rating system was used to rate each of the organizations and sites. The scores for each subcategory were then plotted for each location, and an ellipse depicting the average range was added. The resulting graphical representations can be found below.

According to our rating scale, the emphasis placed on the planning process for SMART implementations, on average, decreased with each iteration of the project (see Figure 43). Both design and technology, on the other hand, increased on average as the projects evolved (see Figures 44 and 45, respectively).

An overlay of the three graphs depicting the emphasis placed on planning, design, and technology, mapped with overall user satisfaction with regards to the SMART environment (see Figure 46), showed the following:

- Changes in the design and technology (either good or bad) over time —more advanced technology, more work areas designed into the system, etc.—were met with little to no changes in user satisfaction, unless the changes were substantial. User satisfaction with the system followed a pattern almost opposite to that of design and technology; satisfaction decreased as the emphasis placed on design and technology increased. Only with the Bedfont implementation, where technology and design were much better than in previous installations, did satisfaction increase slightly.

- Changes in the planning process appeared to have had the greatest effect on user satisfaction. Each drop in the planning process shows a drop in user satisfaction as well.

- To some degree, the increases in design and technology tended to

Figure 43: The Planning Process for SMART Across All Implementations

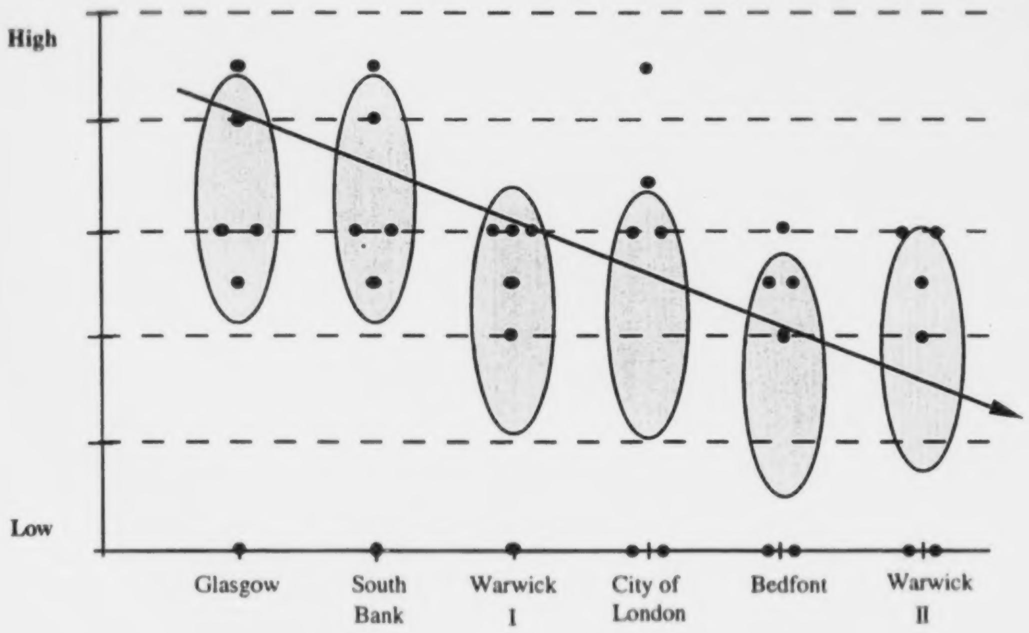


Figure 44: The Design for SMART Across All Implementations

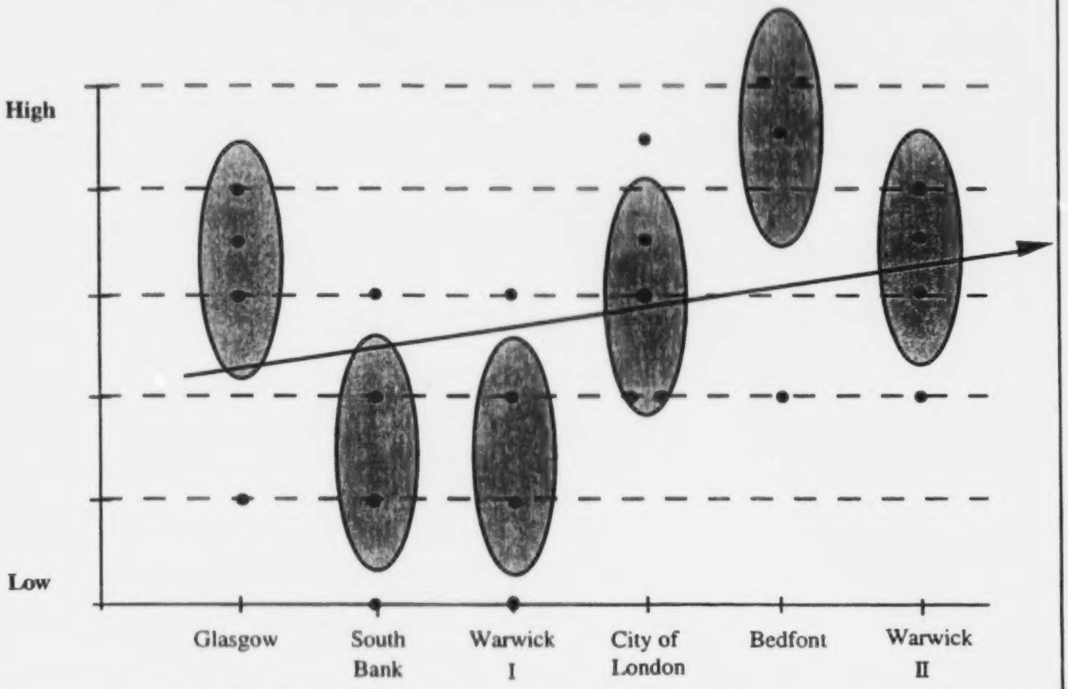


Figure 45: The Technology for SMART Across All Implementations

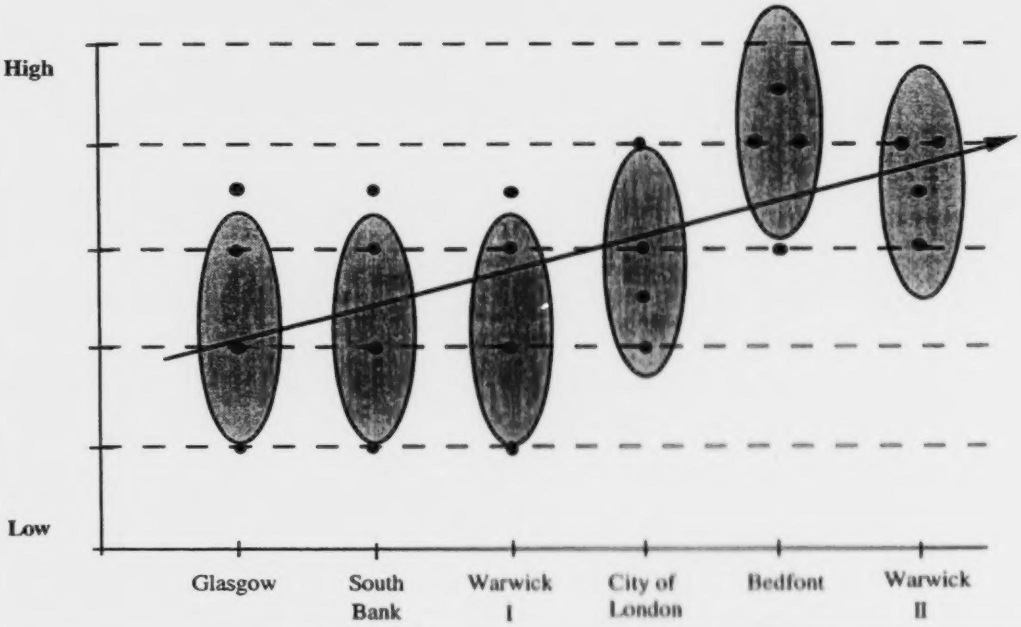
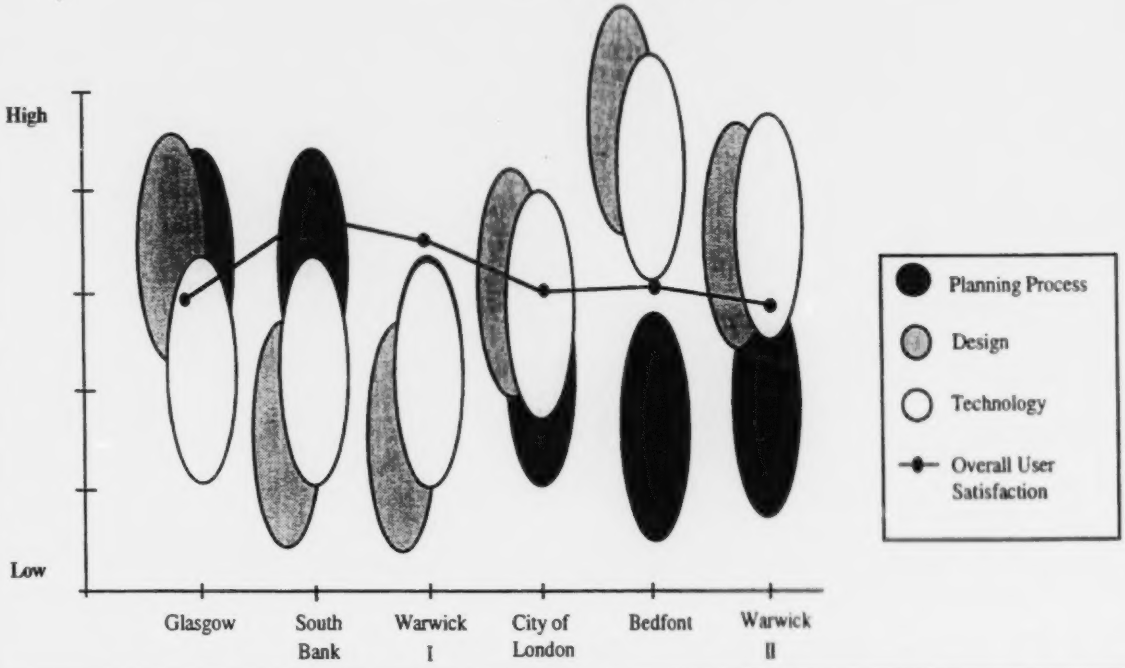


Figure 46: Planning, Design, and Technology of SMART Compared to Overall User Satisfaction



counteract the effect of the planning process on user satisfaction. For example, the decline in user satisfaction at Bedfont and Warwick II were not as severe as in earlier installations, perhaps as a result of the huge increases in technology and design.

These findings indicate that, at least in the case of IBM users, the amount of emphasis placed on the planning process and user involvement had the strongest influence on user satisfaction. Even though the design and technology presumably became better over time, user satisfaction decreased as the planning process became less involved.

Through attempts to standardize the process, it became further and further removed from the users. Changes in the implementation process, such as improved design and technology, also became further removed from the employees; the changes did not automatically reflect the ways in which employees worked. For example, the inclusion of common rooms and common spaces at Bedfont appeared to be a substantial benefit to the overall SMART system, but the rooms and spaces were not used in the manner planners had envisioned. Users failed to use these areas as informal meeting or relaxation areas because, as users commented, "It's not in our culture." Many of the businesses requested that these areas be converted to conference rooms.

Another example of the distancing of the process was the City of London. No individual data was collected on this site; planners relied solely on the ratios and SMART job types established in the UK-wide study. These users, however, had a fairly atypical working pattern in that all of their customers were located in close proximity to the office. Instead of being out of the office 70% of the time working at client sites or other IBM locations, these people worked primarily in the office. Increased use of the office meant that the users had difficulty finding available workstations, and that the company spent a good deal of money on mobile technology that sat idle.

Another item that deserves mention is along the same lines as the idle mobile technology at City of London: users were not happy with the later technology packages because they did not support their work patterns. Each user was issued a laptop with a modem and a printer. Some users—particularly in later implementations when this practice became standard (i.e., Bedfont, Warwick II)— mentioned that they had not even taken their printers out of their boxes, and would have been much happier with a car telephone or some other needed piece of equipment. Users were not necessarily working on reports or customer proposals at home (as the SMART planning team had supposed), but were primarily checking mail, sending e-mail messages, and making telephone calls from home. The larger tasks, according to users, were much easier to conduct at the office. Had efforts been made to change these work patterns, or had individual site data been collected to determine the most appropriate technology package for individual groups of employees, the technology may have better supported work functions. Neither of these preceding options was exercised.

Lessons Learned

Some of the lessons learned from studying the non-territorial offices at IBM, UK included:

- Users needed to have more involvement (or continued involvement) in the implementation process. Attempts to standardize the solution resulted in technology and design that, while "evolving" over time, still only partially reflected the way in which users worked in the system.

- Users did not necessarily take advantage of all aspects of the system. It appeared that many users were not working at home as a substitute for working in the office, but rather as a supplement. In addition, they were performing tasks in the office that might have been better accomplished at home. For example, users often complained of noise and distractions in the office, which made it difficult for them to perform certain tasks in the office. Had users envisioned the system as an integrated workplace strategy, where work was performed according to the most appropriate setting for a particular task, the noise and distractions would not have interfered with individual effectiveness. An integrated workplace strategy, however, requires that the technology and design of the settings support ease of transition between work settings. Going back to the previous "lesson," it is also possible that the technology and design did not allow users to work in this manner.

- In order for users to work effectively in an integrated workplace system—in addition to design and technology "enablers"—users must change their work behaviors and the way they think about their work. In many cases, users must be "taught" to disassociate their work from a specific location. While IBM, UK *did* provide training on how to use the available technology, they *did not* attempt to change users' work behaviors. As a result, users attempted to work in the new system in the old ways. People were still trying to perform most of their work in the office, regardless of whether tasks could be performed more easily in another location, and they quickly reverted to old behaviors: claiming personal workstations in the office, cluttering desks with papers and materials, becoming less flexible, and essentially, "chaining" themselves to particular workstations.

- The lack of a strong management champion for the non-territorial office allowed users to revert to previous work behaviors. When a strong champion did exist, users were less likely to start personalizing (and thus "claiming") particular locations. A champion of the system often helped to explain why the system was designed as it was, and helped users to understand the benefits of working flexibly. Without this champion, users tended to only notice that they no longer had permanent workstations, and saw the SMART concept as a disadvantage.

- Another factor that allowed users to revert to old work behaviors was the downsizing that occurred within IBM, UK after the users had moved into the SMART offices. The offices had been established to support a larger number of people than were actually working in the office at any one time. As downsizing occurred, it was easy for users to reclaim their own desks without upsetting anyone because there were more desks than people. Again, people must make a conscious effort to change work behaviors, and they may have to be "encouraged" to change. Such situations (e.g., lack of champions, instances where the ratios fall to 1:1, etc.) actually encourage people to become more entrenched in old work behaviors.

- IBM, UK attempted to use technology as a bargaining tool for space; departments would acquire technology in return for giving up a certain amount of space. This did not appear to be an effective means of increasing user satisfaction and work effectiveness. In actuality, this bargain may have caused *decreased* satisfaction among the users by increasing expectations to levels IBM, UK could not satisfy. Because a good deal of emphasis was placed on the technology aspect of the system, users expected more than what they received. Furthermore, the technology did not necessarily support their work patterns or tasks.

- As part of a strategic initiative, IBM was able to learn from past experiences, and did not have to start from the beginning at each implementation. Both the design and technology evolved into more sophisticated packages. IBM was also able to review previous projects and implement new aspects of the system that came about as a result of new projects. For example, IBM tried a number of telephone alternatives before designing a system that worked out the majority of the problems associated with handling messages in a non-territorial office. The organization then went back and implemented an identical telephone system at earlier SMART locations.

  In this particular case, the strategic initiative resulted in an attempt to standardize the implementation of the project, which appears to have caused some difficulties in terms of user satisfaction and effectiveness. But this was not necessarily because the project was "strategic," or that it became "standardized." Most likely, the problems arose as a result of the aspects which IBM chose to standardize and its approach to the project as a whole. This idea will be discussed in more detail in the Conclusion section below.

Conclusion

We discuss below each of the specific research questions identified at the onset of the ***Innovative Workplaces*** study with reference to IBM, UK and SMART. Later these questions will be discussed in more detail, with reference to all the organizations studied.

- *What factors (e.g., planning and design process, nature of technology, the design of the setting) tend to change the most as projects evolve?*

All of the factors tended to change over time with regards to SMART. Specifically, the planning process and the SMART solution became more standardized and emphasized less end user involvement in the planning stages. The design evolved over time, adding a variety of workspaces for users to choose from. The technology, while becoming more standardized in the sense that all users were issued the same equipment, became more advanced as new technologies and solutions emerged. All these changes, however, were not "new workplace strategies," however, but refinements of a standard solution.

- *What aspects of the new workplace system tend to become standardized or uniform?*

As mentioned earlier, IBM, UK was attempting to standardize as much of the SMART concept as it could; it was trying to develop one package, or one solution, for all sites. The user information seemed to be more standardized than the other aspects of the project in that the ratios and job types were established at the beginning of the project and were applied consistently throughout its evolution.

- *As organizations expand their implementation of new workplace strategies (within or across sites) does employee response tend to improve, remain the same, decline, or is there no consistent pattern at all?*

In the case of the SMART project, employee response declined as the project expanded. Satisfaction decreased in a pattern similar to that of the emphasis placed on user involvement in the planning and design stages of the project. The less the user involvement, the lower the level of satisfaction.

- *What differences are there in terms of cost and employee response (satisfaction, work effectiveness) as a function of whether the workplace system is primarily cost-driven versus business driven ?*

The SMART project was primarily cost-driven. A secondary benefit that the SMART planning group thought that they could get from the project was increased worker effectiveness and satisfaction. The specific site user needs/demands, however, were not addressed throughout the project because this aspect was standardized at the beginning of the project. As a result, employee satisfaction and effectiveness decreased because of the project.

- *What are the organizational implications of solution-oriented vs. process-oriented workplace systems?*

The SMART project was solution-oriented in that the SMART Country Program developed a single solution, and then tried to implement this solution at each location. The "process" aspect—finding out how users work and behave, what sort of system they would like to or should be working in to best suit their work tasks, etc.— was basically eliminated from the system. As a solution-based project, it became very easy for IBM, UK to standardize the project across sites. The degree to which IBM standardized SMART, however, resulted in the solutions less effectively supporting differences in work situations across sites.

- *How does the implementation process change as the project moves from the pilot stage to widespread implementation? Is it necessary to focus as much attention on all three factors (design, technology, and planning process) in second and third installations to ensure similar success patterns as those achieved in the pilot project?*

As mentioned above, the implementation process changed by becoming more standardized. In IBM's case, this standardization seems to have had a negative impact on user satisfaction and effectiveness. Had more attention been paid to the planning process (which would have, in turn, affected the technology and design), the implementations might have been more well-received.

- *What is the nature of organizational learning that occurs as a function of whether the workplace system is process- vs. solution-driven, cost- vs. business-driven, or part of a strategic initiative versus an independent initiative?*

As mentioned in the *Lessons Learned* section, the SMART project, being a solution-driven, cost-driven, strategic initiative, allowed for organizational learning that may not have occurred otherwise. The nature of the learning, however, tended to be more technology- and design-oriented than user-oriented. Again, while changes were made in the technology and design over time with the intention of making these aspects better, the planning process changed in a way that reduced the sense of ownership, collaboration, and user involvement.

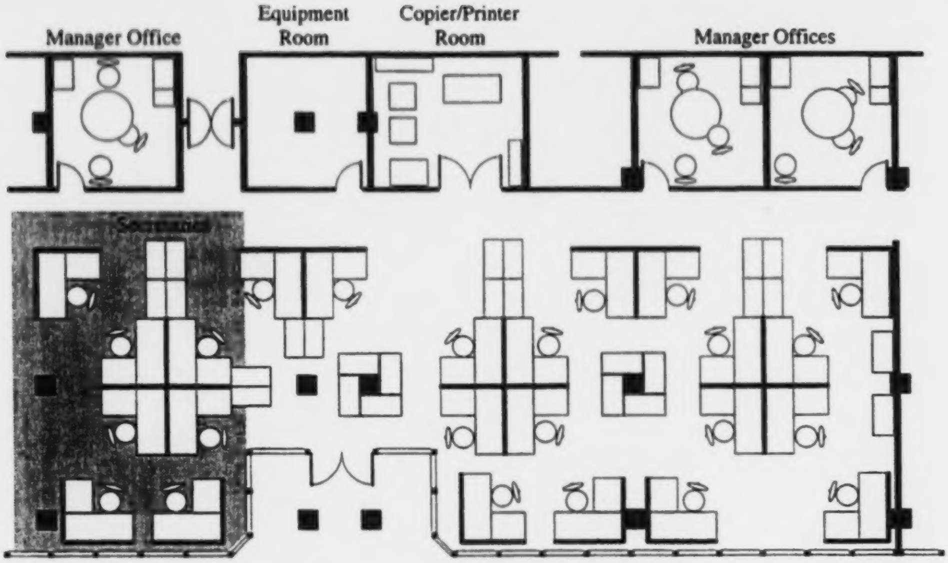

Manager Office
Equipment Room
Copier/Printer Room
Manager Offices
Secretaries

Figure 47: Floorplan of IBM South Bank

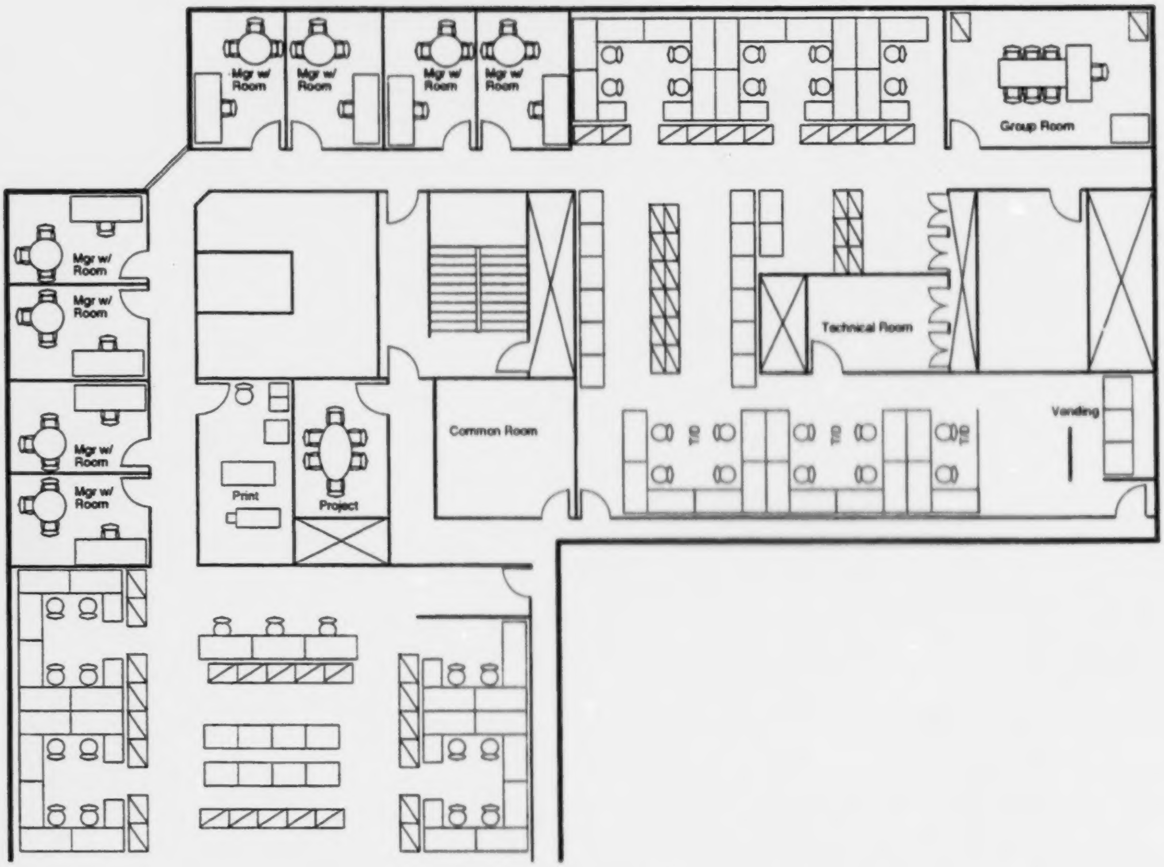

Mgr w/ Room
Mgr w/ Room
Mgr w/ Room
Mgr w/ Room
Group Room
Mgr w/ Room
Mgr w/ Room
Technical Room
Mgr w/ Room
Mgr w/ Room
Common Room
Vending
Print
Project

Figure 48: Floorplan of IBM Bedfont Lakes

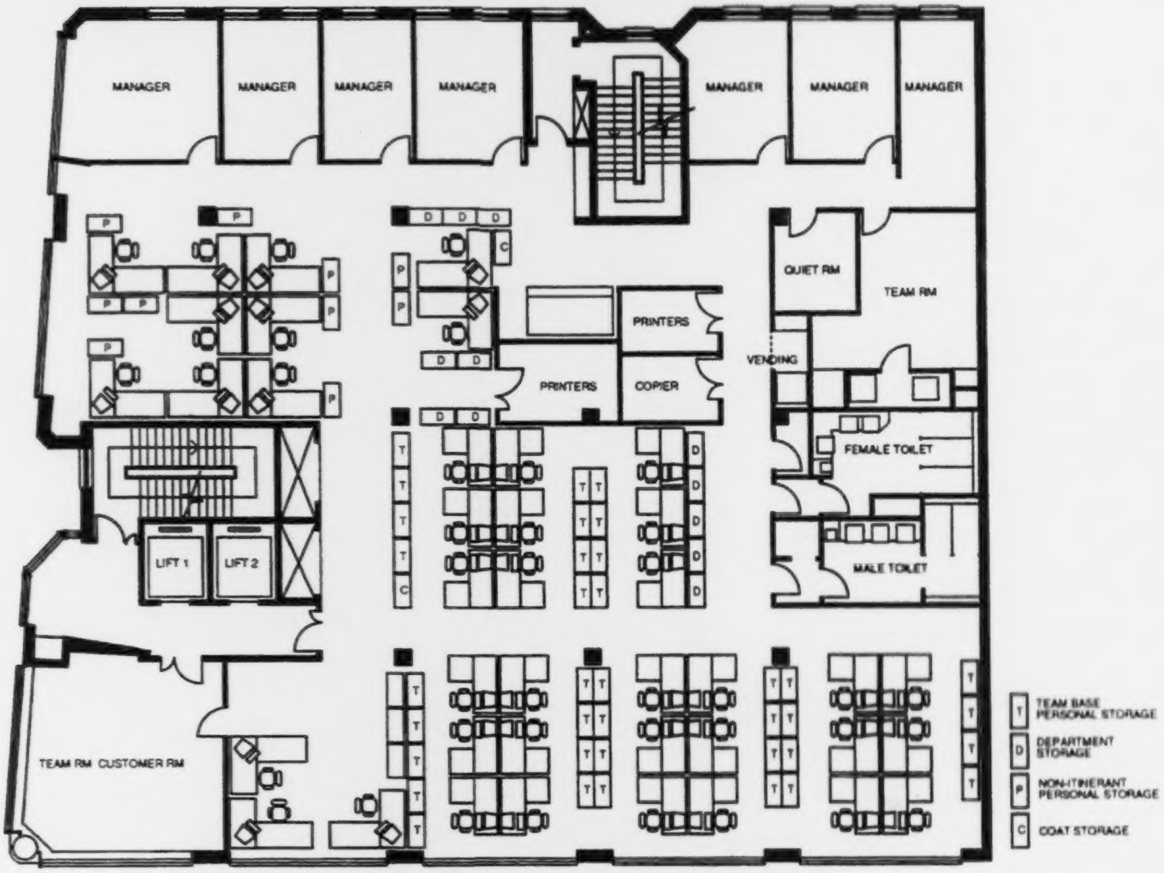

MANAGER
MANAGER
MANAGER
MANAGER
MANAGER
MANAGER
MANAGER
QUIET RM
TEAM RM
PRINTERS
PRINTERS
COPIER
VENDING
FEMALE TOILET
MALE TOILET
LIFT 1
LIFT 2
TEAM RM CUSTOMER RM
T TEAM BASE PERSONAL STORAGE
D DEPARTMENT STORAGE
P NON-ITINERANT PERSONAL STORAGE
C COAT STORAGE

Figure 49: Floorplan of IBM Glasgow

Ernst & Young, London

Workplace Strategy Overview

Shared workstations for auditors are fairly common in major accounting firms and have been so for many years. In 1988 after the merger of Ernst & Whinney and Arthur Young, Ernst & Young in London decided to house a division of management consultants in shared offices. The shared offices, which were implemented in the Management Consulting Services (MCS) department, constituted an innovation in that the concept was applied to higher-level management consultants rather than auditors.

Two case studies from Ernst & Young center around the MCS department (see Figure 50: Ernst & Young Timeline), which initially was scattered on different floors and throughout several buildings. The first, small implementation involved only that portion of MCS located in a building called Becket House. The second, larger implementation involved the consolidation of MCS and the renovation of Becket House floors nine and ten, where these employees were housed.

Photo 10: Ernst & Young Overall

Shared-Assigned Office Concept

The implementations at Ernst & Young differed from the other companies we studied in that the new environments were actually shared-assigned offices rather than non-territorial. In shared-assigned offices, employees are assigned to work at specific locations at greater than 1:1 employee:workstation ratios. For example, three people might be assigned to a single workstation.

Goals/Drivers of Shared Offices in Ernst & Young, MCS

- *Contain and reduce facility costs by reducing space requirements.*
- *Consolidate MCS Department.*
- *Offer space allocation compromise to private and non-territorial offices.*

Principles of Shared-Assigned Offices

- *Desks are assigned at a greater than 1:1 employee-to-workstation ratio.*
- *Employees are expected to work at their assigned locations unless occupied by another "owner."*

This concept differs from non-territorial offices in that employees no longer have the freedom to choose where to work on a day-to-day basis. On the other hand, this type of office system allows employees a constant working environment: when in the office, they occupy the same location, next to the same people, with the same telephone number, etc. For some employees, this can be a drawback because there is the constant worry that someone else assigned to the same desk will arrive. Shared offices are attractive to many organizations because they can save space through a reduction in the number of workstations, but accomplish this in a more "traditional" manner, as opposed to a full non-territorial office.

The shared-assigned office implementations at Ernst & Young were not part of a strategic initiative by the company; the projects were independent initiatives undertaken by MCS and the Facilities Management department. The idea of shared and non-territorial offices has recently spread internationally; Ernst & Young in Chicago and in New York have also implemented independent alternative office environments for higher-level consultants.

The MCS shared offices were also cost-driven. The key concern of the partners in both implementations was to reduce the amount of space they occupied to avoid paying for "extra" space. In an effort to reduce the overall costs of the two projects, many "performance" features recommended by both the outside consultants and the Facilities Management department were rejected by the partners.

Both projects were also solution-driven; the project planners approached the project with a solution—shared-assigned offices—already in mind.

Cost Savings Associated with Shared-Assigned Offices

As Table 17 illustrates, the annual lease cost savings for each of the shared-assigned office implementations was quite substantial.

Table 17: Cost Savings Associated with Shared-Assigned Offices

	MCS # 1		MCS # 2	
	Previous Environment	**Shared-Assigned Office**	**Previous Environment**	**Shared-Assigned Office**
Total Area	8,160 sq. ft.	5,525 sq. ft.	23,562 sq. ft.	15,000 sq. ft.
Cost per sq. ft.	$145	$145	$198	$198
Total cost	$1,183,200	$801,125	$4,665,276	$2,970,000
Savings		$382,075		$1,695,276

Summary of Shared-Assigned Office Installations Across Time

Methodology

The same profiles used to compare SMART at IBM were applied to the first and second installations of shared-assigned offices at Ernst & Young. To some extent these profiles were tailored for Ernst & Young, using terms more specific to MCS; but overall the same profiles apply to all companies.

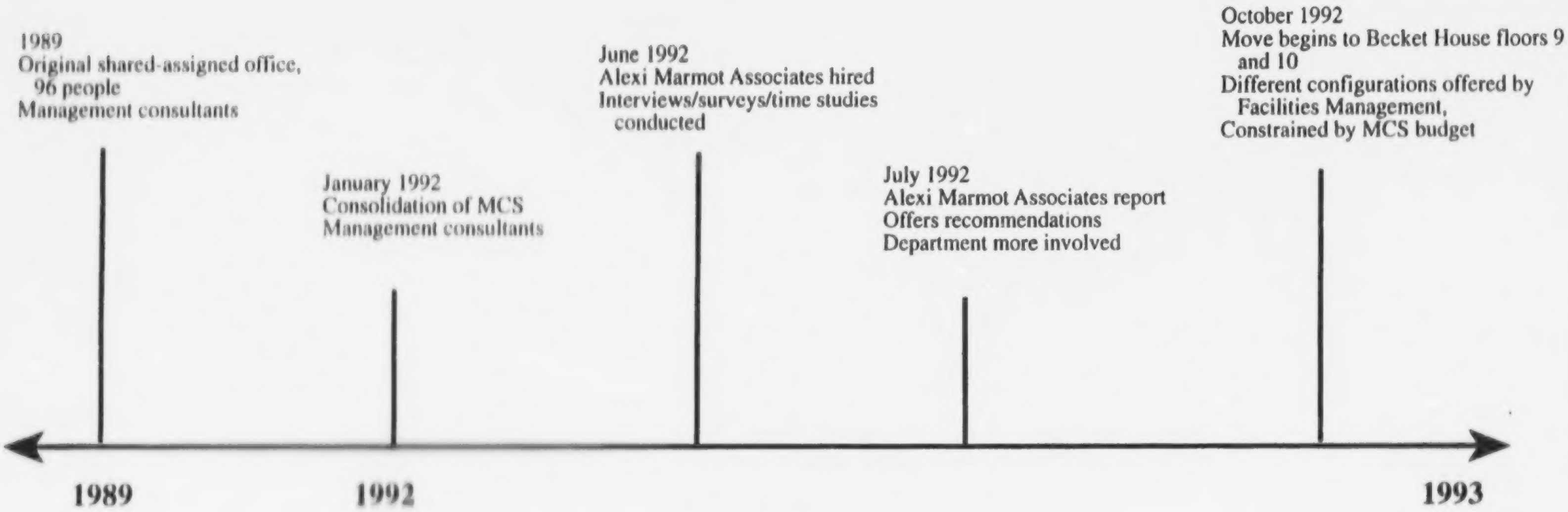
A more detailed description of each of the projects at Ernst & Young can be found in Appendix B.

The Planning Process

Again, the six major areas identified as important in the process of planning new office environments included: project ownership by the business/department/group involved; collection of data on work time-activity patterns; collaborative, cross-departmental involvement; the degree to which end users were involved; the method of informing or involving users; and the training provided. These six areas were then broken down into more detailed components and compared across the shared-assigned office implementations.

Figure 51 summarizes the planning process for each of the shared-assigned office installations. One of the primary differences between the first and second installations was the emphasis placed on the planning

Figure 50: Ernst & Young Timeline


1989
Original shared-assigned office, 96 people
Management consultants
January 1992
Consolidation of MCS
Management consultants
June 1992
Alexi Marmot Associates hired
Interviews/surveys/time studies conducted
July 1992
Alexi Marmot Associates report
Offers recommendations
Department more involved
October 1992
Move begins to Becket House floors 9 and 10
Different configurations offered by Facilities Management,
Constrained by MCS budget
1989
1992
1993

stage in the second installation. The second installation was much more planning-process intensive, whereas the first implementation devoted little effort to the planning stages.

Project Ownership

Basically, Facilities Management owned the first project involving shared offices in MCS. The Facilities Management department planned and designed the project, although the Director of Administration in MCS made all key decisions. In the second installation, however, project ownership by MCS was strongly emphasized from the outset (see Figure 51). When Facilities Management was approached by MCS to renovate the space and consolidate MCS in Becket House, FM encouraged MCS to "own" the project; FM proposed to merely facilitate the process.

However, "ownership" implies participation by the entire business unit or department; it suggests that all levels of employees influence the shape of the project and tailor the project according to individual or group work needs. From our observations of the planning process and from interviews with MCS employees, it appears that only the partners in MCS actually owned the project.

Project Teams/Committees Established

In the first installation, no committees or user groups directed the implementation of the project. In the second installation, a steering committee of senior partners, as well as professionals from HR and FM, was formed at the beginning of the planning process to manage the project (see Figure 51: Ernst & Young Shared-Assigned Office Planning Process). This steering committee, in conjunction with other partners in the department, made all significant decisions regarding the project.

Two other committees, the Accommodation and Advisory committees, also helped plan and design the second installation. The Accommodation group was composed of top MCS management, while selected consultants from various practices in MCS constituted the Advisory group. The two groups reviewed copies of all reports, discussed recommendations, and had some (although very little) influence over planning the project. From interviews with consultants, however, it was evident that these two groups in reality had little control over the project. Any ideas—whether

Figure 51: Ernst & Young Shared-Assigned Office Planning Process

		MCS #1	MCS #2
Project Ownership:	Departments/Groups/Businesses	○	●
Groups/Teams/Committees:	Steering Committee	○	●
	User Representatives (non-managers)	○	●
	Managers	○	●
	Other	○	○
Collaborative Team Project:	Departments/Groups/Businesses	●	●
	Facilities/Premises Management	●	●
	Space Planning Consultants	○	●
	Management Information Systems	○	●
	Human Resources	○	●
Data Collection:	Occupancy Patterns for Group/Site	○	●
	Needs Analysis for Group/Site: Space	○	●
	Technology	●	●
Method of Informing or Involving End-Users (non-managers):	Workshops	○	○
	Seminars	○	○
	User meetings	●	●
	Bulletins/Newsletters	●	●
Training:	Shared Assigned Offices/Technology	○	○

○ Did not have
● Did have
▨ Occurred post-implementation

from these two groups, the outside consultant, or Facilities Management—had to be discussed and approved by the partners. The partners rejected many of the ideas presented by these people, such as pooled desks, conference rooms, and appropriate ratios of desks to employees (see Appendix B).

Collaborative Team Effort

The second implementation was much more collaborative than the first. In addition to MCS and Facilities Management, people with backgrounds in MIS and HR, as well as outside consultants, made recommendations for how the shared-assigned office should look (see Figure 51).

End User Involvement

The involvement of end users remained virtually unchanged from MCS #1 to MCS #2. In both cases, users were informed about the project through bulletins and newsletters, and through meetings with partners or top management. In the second implementation, end users formed an Advisory group, but again, this committee functioned primarily as an informational link between partners and the end users.

Data Collection

In MCS #1, very little data was collected; data collection was limited to a study of the technology needs of the department. In the second installation, data was collected on the occupancy patterns of MCS consultants, as well as their needs in terms of space and technology.

Although this data was collected and recommendations were made, partners had the final word on the design of the shared offices. A number of recommendations (e.g., the amount of space necessary to house the department; the appropriate desk-to-employee ratios; the types of space and furniture needed to support this type of office system; etc.) were rejected by the partners. A primary reason that these recommendations were not implemented concerned the cost constraint that the partners placed on the project. They were unwilling (or unable) to pay the added cost that these recommendations would require.

Training

No training in the use or management of the shared-assigned offices, or in the application of new technology, was provided in either the first or second installation.

Summary of Planning Process Over Time

To summarize some of the changes in the planning process:

- More importance was accorded to the process planning the shared-assigned offices.

- Ownership of the project by end users was more strongly encouraged.

- The project grew much more collaborative; more professional experts participated in the second installation.
- More data on departmental occupancy patterns and space requirements was collected in the second installation.
- More efforts were directed at including/informing users of the project progress.

Design

The design of a working environment should support the ways in which people work. For non-territorial offices, some of the major attributes that help users work more effectively include:

- Multiple forms of work areas to support different tasks performed in the office, such as concentrative work, team projects, small meetings, etc.
- Adequate storage for both personal and work-related materials.
- Flexibility in the design to handle peak periods and departmental growth (both temporary and permanent).
- Common areas for meetings (formal and informal) and break-out areas for relaxation.
- Surroundings that encourage communication, collaboration, and exchange of ideas, without negatively impacting the productivity of the group.

Figure 52: Ernst & Young Shared-Assigned Office Design (on thee following page) describes some of the physical attributes of the two shared-assigned office projects. One of the major design goals was to try and correct some of the problems identified in the outside consultant's interviews with employees in MCS: little or no natural lighting in the office, crowded workspace, and poor ventilation.

Multiple Workstations

The variety of workstations did not change materially from MCS #1 to MCS #2 (see Figure 52: Ernst & Young Shared-Assigned Office Design). The primary difference involved the size and distribution of work space. Consultants were assigned to workstations at ratios of approximately 3 employees to each desk in MCS #2, as were consultants in MCS #1. These

Figure 52: Ernst & Young Shared-Assigned Office Design

		MCS #1	MCS #2
Multiple Workstations:	Primary workstations	●	●
	Touch down workstations	○	○
	Work rooms/quiet rooms	○	○
	Partner office accessible if unoccupied	○	○
	Dedicated visitor workstations (dept.)	○	○
	Dedicated visitor terminals (location)	○	○
Storage Alternatives:	Mobile pedestals	●	●
	New personal storage cabinets	○	○
	Mid-level storage cabinets	●	●
	Overhead storage areas	●	○
	Floor-to-ceiling common storage areas	●	○
Common Areas:	Conference rooms	○	○
	Break-out areas	○	●
Design Considerations:	Low panels	○	●
	Glazed office partitions	○	●
	New furniture	○	○

○ Did not have
● Did have
▨ Occurred post-implementation

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workstations were surrounded by low paneling versus high paneling as in MCS #1 to allow more natural lighting to filter through the office. However, executive consultants in MCS #1 were assigned to an individual office, whereas in MCS #2 four executive consultants were assigned to a single office. In MCS #2, partner offices were also slightly reduced (compare Photos 11 and 12).

No additional workspaces, such as work rooms or visitor workstations, were added to either design.

Photo 11: MCS #2 Workstation

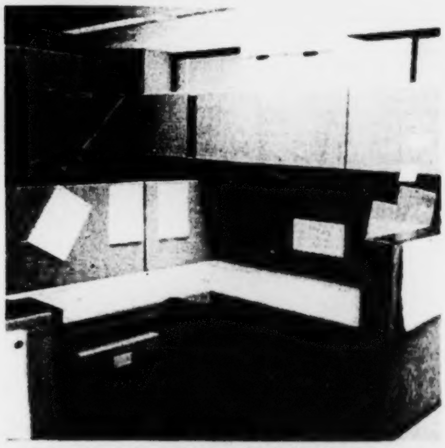


Photo 12: MCS #1 Workstation

Photo 13: Aisle Storage in MCS #1

Storage Alternatives

The storage space available in MCS #2 was much less than in MCS #1. Users were issued mobile pedestals and mid-level storage cabinets with drawer files, but lacked the overhead storage and the floor-to-ceiling common storage areas present in MCS #1.

Facilities Management's original plan for MCS #2 eliminated the overhead storage and floor-to-ceiling storage cabinets to allow for more natural lighting in the office. These were to be replaced by new, midsize storage cabinets. Because of cost constraints on the project, however, the partners rejected the second portion of the plan; all of the overhead storage cabinets and floor-to-ceiling cabinets were removed from MCS, but nothing was provided in exchange. This decision, while complying with the original goal of allowing more natural lighting to penetrate the office, greatly reduced the amount of storage available in MCS.

Common Areas

The MCS #1 design included no common areas. The outside consultants proposed conference rooms, break-out areas, and quiet offices on each floor in MCS #2; but again cost constraints prohibited this recommendation from being implemented. The second installation did provide small break-out areas on each floor, but did not incorporate conference rooms or other common areas.

Design Considerations

Between workstations high partitions replaced low panels in the second installation. In addition, instead of having enclosed walled offices, partners were given offices in which the interior wall was constructed of glazed glass. Both of these design considerations permitted more natural light to penetrate the office.

Summary of Design Over Time

To summarize the design changes in the MCS offices:

- On average, space per employee was reduced from MCS #1 to MCS #2. Executive consultants and partners both had smaller accommodations in MCS #2 than in MCS #1.
- Emphasis on comfort increased over time. In MCS #2, certain design considerations (e.g., glazed partitions, lower storage facilities

and desk panels, permanently assigned desks located near windows, etc.) were added to the office. These design features were a direct result of feedback from the users through interviews and focus groups.

- Overall storage declined in MCS #2 through the elimination of certain forms of storage. Alternatives or replacements were not provided.
- Break-out areas not present in the initial implementation were added to the second implementation.

Technology

The three areas of technology found to be important to the implementation of non-territorial offices included: technology available in the office; technology to support work outside of the office; and technology to support communication. Figure 52: Ernst & Young Shared-Assigned Office Technology depicts the technology Ernst & Young employed at each MCS project.

Computers

The technology available to users at each of the projects was identical: PC terminals in the office connected to the LAN; laptop technology for outside the office. Access to the technology, however, increased in the second installation. Instead of 85% saturation of PCs in the office, 100% of the workstations had a PC in MCS #2. Laptops were also issued to all employees who could justify the need for such technology, rather than being pooled as in MCS #1.

Voice Communications

In MCS #1, users retained the same telephone and messaging system: calls came to main reception and were then transferred to the individual workstations. In the second installation, a new telephone system with direct dial capabilities was planned. However, the new system was not fully operational when employees began setting up in the new space, and was actually installed after move-in occurred.

Special Technology

Some users were issued car telephones, but this equipment was not issued as a part of the shared-assigned office technology package. If the user could justify the equipment, then it was issued on an individual basis.

Photo 14: Lack of Aisle Storage in MCS #2

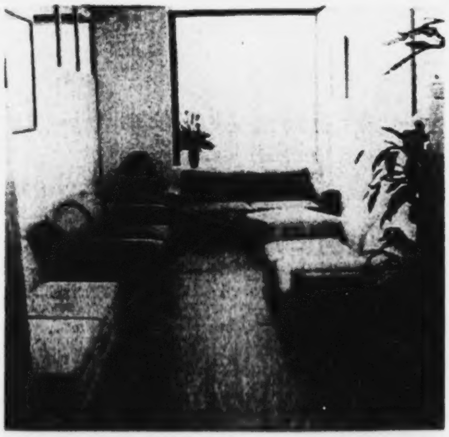


Photo 15: Break Area in MCS #2

Figure 53: Ernst & Young Shared-Assigned Office Technology

		MCS #1	MCS #2
Office Technology:	Increased access to latest PC	○	●
	Docking stations to link portables	○	○
	Access to printer, fax, modem	●	●
	Electronic diary/mail	○	○
Non-Office Technology:	Latest PC terminal	○	○
	Latest portable computer w/ modem	●	●
	Home printer	○	●
	Fax	○	●
Voice Communications/ Telephone System:	Direct dialing number	○	▨
	Voice mail/messaging	○	○
Special Technology Available to Users†:	Car telephones	●	●
	Customer site terminals	○	○
	Other	○	○

○ Did not have
● Did have
▨ Occurred post-implementation

† Equipment not part of standard technology package; available if user can justify.

Summary of Technology Over Time

To summarize:

- Equipment for use both inside and outside the office became more accessible.
- The telephone system, when fully operational, offered direct dial capabilities; telephone calls no longer went through main reception first, but went directly to the individual workstations.

Employee Satisfaction and Work Effectiveness

To better understand the changes in the working environment at Ernst & Young as a result of the shared office implementations, the IWSP research team conducted a standard workplace survey for each implementation, as well as focus groups and interviews with the users. Due to time constraints, we were unable to carry out as many focus groups and interviews in the second implementation of shared offices, but our understanding of the system, combined with the free responses on the surveys, gave us a fairly clear idea of user satisfaction and work effectiveness. This section presents some of the results of the interviews and surveys, and discusses the correlation of user work effectiveness and satisfaction ratings with changes in the office system and the implementation process.

Table 18: Data Collection for Ernst & Young

Data Collection Technique	Total Number of People	Total Number of Locations
Cornell Workspace Survey	64	2
Focus Groups	4	1
Interviews	17	2
Personal Observation	—	2

Survey Background Data

User Profile

Job types of all the employees surveyed and interviewed fell into the following categories:

- managing consultants;
- executive consultants;
- senior consultants;
- consultants;
- research analysts;
- secretaries;
- senior managers;
- others.

Figure 54: Surveys Respondents by Job Type

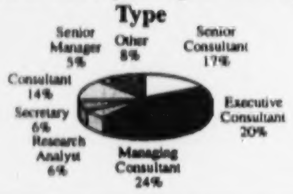


Figure 55: Surveys Respondents by Age Group

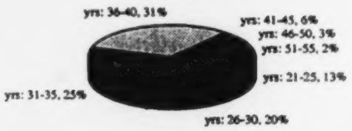
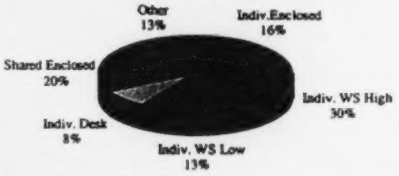


Figure 56: Surveys Respondents Previous Workstations



The majority (75%) of the users surveyed were consultants. Research analysts and secretaries constituted the second largest group; each job type constituted 6.2% of the surveyed population (see Figure 54). The only differences with satisfaction according to job type involved overall satisfaction, home issues, and storage/personalization. For all the above issues, executive consultants tended to rate their satisfaction higher than senior consultants and consultants. For example, senior consultants rated their overall satisfaction with the new office environment 1.8, while ex-

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ecutive consultants rated their satisfaction 2.7 (t= -2.114, df= 22, p= 0.0461). For storage and personalization, these means were 1.7 and 2.6, respectively (t= -2.908, df= 22, p=0.0082).

The largest group of users surveyed were between the ages of 36 and 40. The 31 to 35 age bracket was the second largest population, comprising 25% of employees. The smallest age group was from 41 to 55 years of age, with only slightly more than 10% of all respondents falling in this age bracket (see Figure 55). All of the issues tended to be rated about the same by all age groups.

Most of the people surveyed (73%) had been working in the environment 1 to 6 months. The 25% of employees who had worked in the shared office environment over 6 months were atypical; this data had nothing to do with the timing of the two surveys. The surveys were distributed after similar intervals of occupation for both groups.

In the first implementation of shared offices, users generally moved from private individual offices or shared enclosed offices (almost 60%, evenly distributed across both). By contrast, in the second implementation the majority of users moved from workstations with either low or high panels (see Figure 56). There were no statistically significant differences in the satisfaction scores of employees from different working environments before the implementation of shared-assigned offices.

For more information on the survey and the response rating system, please see the *Data Collection Methods* in the *Methodology* section. A complete survey can be found in Appendix D.

Benefits of Shared-Assigned Offices

Users identified three principle benefits of working in the shared-assigned offices:

1) **Communication with coworkers:** In both offices, users commented that they had much better contact and communication with their coworkers. Employees were better able to see their coworkers in the office without communication barriers such as office walls.

2) **Improved working environment:** Employees, particularly in the second installment of shared offices, commented that the working

environment was much more agreeable than the previous environment. They cited more daylight in the office, and rated the overall atmosphere much improved.

3) **The office became much busier:** Many users commented that the office appeared much busier than the previous environment, and that there were fewer empty desks. This created a new and welcome "buzz" or "charge" during the workday.

Disadvantages of Shared-Assigned Offices

Users identified three major disadvantages/areas of improvement:

1) **Poor technology for working out of the office:** This response occurred primarily among the users in the second implementation. (Users in the first implementation were not given mobile technology.) Although the provision of laptops was considered a benefit, users expected the technology to be better than it was. Employees stated that they needed support for the laptops when working outside the office, such as printers, fax machines, and modems.

2) **Noise/distractions in the office:** This was a common complaint among users from both shared-assigned office implementations. Employees enjoyed being able to quickly communicate with coworkers, but the noise and distractions made it difficult for them to perform concentrative work or conduct telephone conversations with clients.

3) **Storage space for work related materials:** This was a common complaint among users from both implementations. Employees complained not only that they sometimes sat a long distance from their files, but also that the amount of storage available for the materials was inadequate.

Issues of Most Importance to MCS Shared-Assigned Office Users

The ten issues that, on average, were most important to all MCS users were:

- quality of individual work;
- ability to concentrate in the office;
- auditory privacy in the office;
- access to technology at home;
- amount of individual work accomplished in the office;
- quality of work performed at home;
- ease of concentration at home;

- ability to deal with confidential issues in the office;
- amount of storage for work-related materials provided in the office;
- ability to receive telephone calls while in the office.

Issues of Least Importance to MCS Shared-Assigned Users

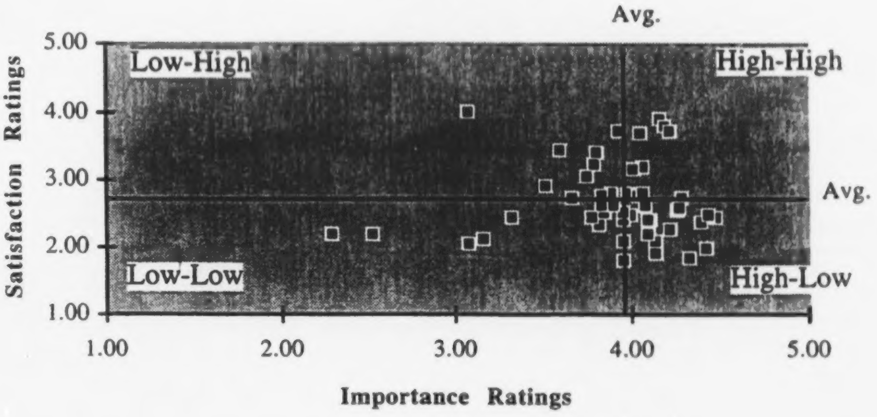
The three least important issues were:

- display of personal items;
- availability of informal break areas;
- display of work related items in the office.

A scattergram depicting the importance and satisfaction ratings for each issue indicated that satisfaction/dissatisfaction did not tend to influence the importance ratings for an issue. For example, the satisfaction rating for the opportunity to display personal items in the shared office environment versus the previous office environment was very low——only 2.18 (the lowest satisfaction rating for any issue). The importance rating, however, was also low at 2.29 (one of the lowest importance ratings).

The scores tended to fall in the "High-High" quadrant (high satisfaction, high importance) and the "High-Low" quadrant (high importance, low satisfaction), but the scores appear to be fairly even across all of the quadrants.

Figure 57: Satisfaction Ratings Compared to Importance



Issues of High Importance and High Satisfaction

Referring to the above scattergram, issues of high importance and high satisfaction included:

- quality of work performed at home;
- ability to concentrate at home;
- access to coworkers;
- access to computers in the office;
- amount of work accomplished at home;
- quality of work performed in a group;
- employees' stress level at home.

Issues of High Importance and Low Satisfaction

Issues of high importance and low satisfaction included:

- quality of individual work;
- ability to concentrate in the office;
- level of technology provided;
- auditory privacy in the office;
- access to technology for working at home;
- amount of individual work accomplished;
- ability to deal with confidential issues;
- amount of storage provided for work-related materials;
- receiving telephone calls while in the office;
- sense of being valued by the organization;
- ease of access to files and reference materials;
- ability to handle mail, text, etc. at home;
- ability to make telephone calls in the office;
- conversational privacy in the office;
- the number of conference rooms provided;
- the availability of resource centers;
- stress level at work.

Many of these issues center around available technology, voice communications in the office, and privacy. The decision not to provide "quiet rooms" or other designated areas for high concentration/low interaction appears to be a large factor in the low employee satisfaction ratings. At the time the second survey was given to the MCS users, the department was experiencing difficulties with both the technology and the telephone system. Our prediction is that as employees have more time to work in the office and as some of these problems are corrected, the list of high importance/low satisfaction issues will decrease.

Issue Indexes

In order to more clearly demonstrate the changes in user satisfaction from the first to the second MCS project, the ten issues of most importance were grouped into seven major categories. These categories were:

- work effectiveness;
- communication;
- technology;
- home;
- privacy;
- storage/personalization;
- alternative spaces/design.

Again, the ten issues that, on average, were most important to all MCS users were:

- quality of individual work;
- ability to concentrate in the office;
- auditory privacy in the office;
- access to technology at home;
- amount of individual work accomplished in the office;
- quality of work performed at home;
- ease of concentration at home;
- ability to deal with confidential issues in the office;
- amount of storage for work-related materials provided in the office;
- ability to receive telephone calls while in the office.

The user satisfaction ratings for issues falling under these categories were then graphed for each site (e.g., the quality and amount of work accomplished in the office—*issues*— were grouped under the category "Work Effectiveness"). A mean score, or "index," of all the issues in a particular category was also graphed for each site.

When appropriate, certain issues were listed under more than one category. For example, "Access to technology at home" falls under both the Technology Index and the Home Index. In addition, issues not among the ten issues of most importance were occasionally added to the index to help clarify advantages/disadvantages of the individual projects and the system as a whole

One problem that the IWSP team encountered in comparing MCS #1 with MCS #2 was that the first survey was distributed more than three years prior to the second implementation. During that time, the Cornell Workplace Survey evolved into a more comprehensive survey of user satisfaction and work effectiveness. While it was possible to compare the projects (most of the top ten issues were included on both surveys), occasionally questions that were asked of the second group of users were not asked of the first group (e.g., issues relating to working at home, conversational and visual privacy, etc. were not part of the first survey). Because of the elapsed time since the first implementation, it was not possible to resurvey the original users to obtain this additional information. The index graphs indicate which issues were included/excluded from the surveys by the number of hatch marks included for each project.

Work Effectiveness Issues

Three issues among the ten most important were grouped under work effectiveness: ease of concentration in the office; quality of individual work accomplished in the office; and amount of individual work accomplished in the office. The amount and quality of group work and the ease of access to files and reference materials were also added to the overall index.

In both MCS projects, users tended to rate work effectiveness issues "the same" to "somewhat worse" in the shared environment compared to the previous environment (see Figure 58: Work Effectiveness Index). The biggest disadvantages to the shared office arrangements were ability to concentrate in the office, the amount of individual work accomplished in the office, and the ease of access to files and reference materials.

Users rated their satisfaction with work effectiveness issues slightly higher in the second implementation. The main issues rated higher in the second implementation were the amount and quality of work users were able to perform as a group.

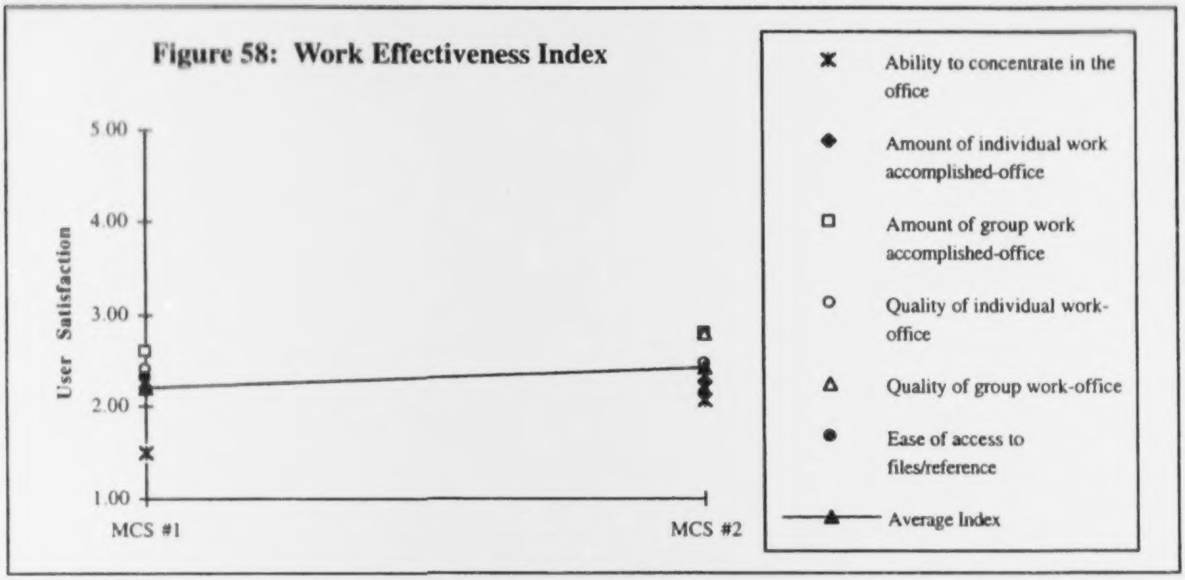


Figure 58: Work Effectiveness Index

Quality and Amount of Group Work Accomplished in the Office

Users rated the quality and amount of work they were able to accomplish as a group higher in the second implementation than any other work effectiveness issues. These scores are deceptive, however; the majority of respondents rated these issues "about the same" in comparison to their previous environments. These ratings were somewhat surprising, considering that a primary goal of the second implementation was to consolidate MCS onto one or two floors to help facilitate departmental cooperation. The actual working patterns of consultants revealed that much of the work is accomplished independently, rather than through teamwork. Consolidation of the department arguably helped to promote informal interaction, but did little to facilitate group achievement.

Ability to Concentrate in the Shared-Assigned Office Environment

Many of the users responded that they had a difficult time concentrating in the new office. Users cited noise and frequent interruptions as the main deterrents to concentration. The offices tended to be very noisy at all hours of the day, and the increased visibility of users encouraged people to stop and "chat." Enhanced ability to communicate with coworkers was cited as a benefit both MCS implementations, but the interruptions often impeded users' ability to perform work.

Communication Issues

The only issue grouped under communication to fall in the top ten most important issues to survey respondents was the ability to receive telephone calls in the office. Access and communication with coworkers and managers, ability to make telephone calls while in the office, and ability to receive messages and mail were also added to the index to give a more comprehensive representation of the communication index.

Access and Communication with Coworkers

Access to and communication with coworkers were consistently rated "the same" to "somewhat better" in the new office environments for both office implementations (see Figure 59: Communication Index). The frequency distribution indicated that over 75% of users rated communication in the new environment the same or better than in the previous environment (see Figure 60: Frequency Distribution for Communication with Coworkers in Shared-Assigned Offices Across All MCS Projects). Open-ended questions indicated that users felt location in the same building in MCS #2 significantly facilitated communication with coworkers. Users in both projects commented that, because the new office environment was much more open, they were able to see more of their coworkers.

Ability to Communicate with Managers and Ability to Receive Mail

Employee satisfaction with the ability to communicate with managers and ability to receive mail was essentially unaffected by the introduction

Figure 59: Communication Index

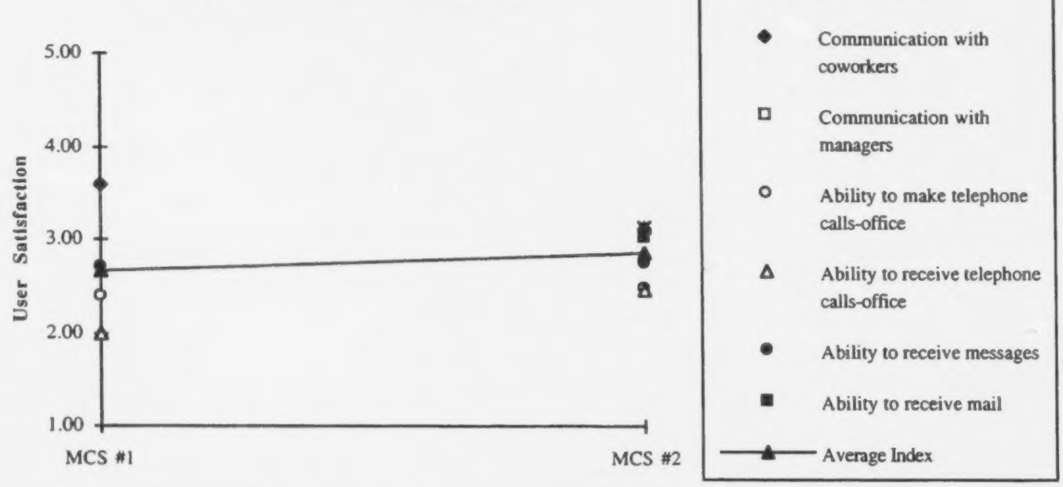
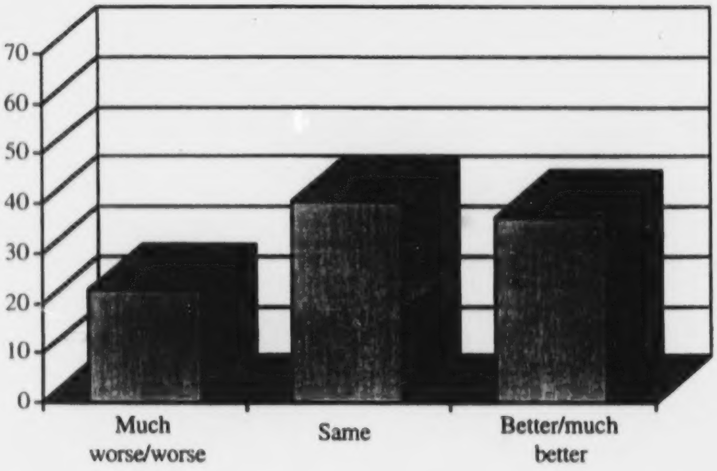


Figure 60: Frequency Distribution for Communication with Coworkers in Shared-Assigned Offices Across All MCS Projects



of shared-assigned offices. In the second implementation, most survey respondents (79% and 88%, respectively) rated these issues "the same" in the new environment.

Telephone Communications

Employees generally rated their ability to make and receive telephone calls lower in the new environment. The ability to make telephone calls in the office was directly affected by the noise level in the office. The inability to locate workers in the first implementation greatly impeded user ability to receive telephone calls. Problems associated with the new telephone system had a similar effect in the second implementation (see below).

In the first implementation, three to four users were assigned to each workstation. More senior people had priority over less senior employees, and could "bump" these employees to other workstations. Routing incoming calls to "bumped" employees thus became more difficult. In the second implementation, designers tried to eliminate this problem by installing a new telephone service with a direct-dialing function allowing users to log into a particular workstation telephone. Upon occupation of the new office, however, this telephone system was not fully operational. Users and customers complained that the level of service had decreased as a result of the telephone system. It is expected that this dissatisfaction will decrease as the problems are worked out of the new telephone system.

Technology Issues

Access to technology at home was rated among the ten most important issues overall. Access to technology at the office and ability to handle mail/text from home were also added to the index.

At the time of the first implementation, MCS did not support working at home. Users were not given laptops, modems, or portable printers, although some employees had a PC available to them at home. This PC allowed users to supplement their work in the office rather than to replace it, and was issued on an individual basis.

In the second implementation, MCS began providing technology for use out of the office. Nonetheless, the majority of users rated their access to technology out of the office as "the same" to "somewhat better" than in the previous office (see Figure 61: Technology Index). Considering the fact that MCS issued laptops and printers to many MCS users, one likely explanation for these relatively low scores relates to the timing of equipment assignment. Many of the users were given laptops and printers before they actually moved into the new office, and therefore did not necessarily associate the new equipment with the new office environment.

Figure 61: Technology Index

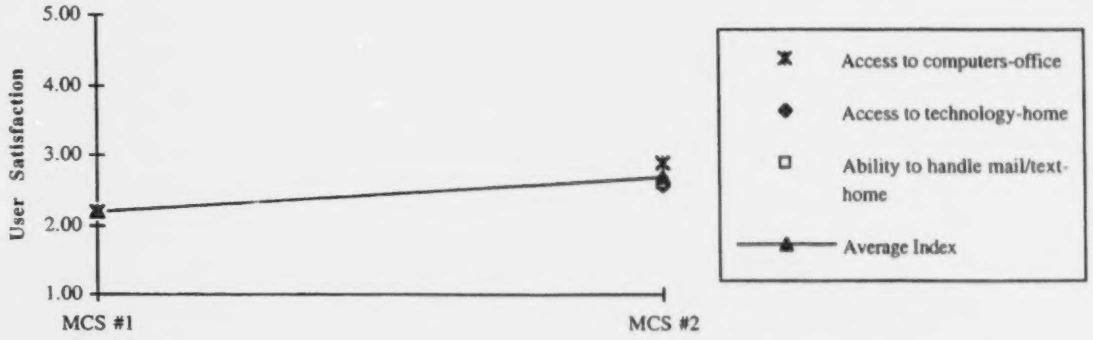


Figure 62: Frequency Distribution for Access to Computers in Shared Assigned Offices Across All MCS Projects

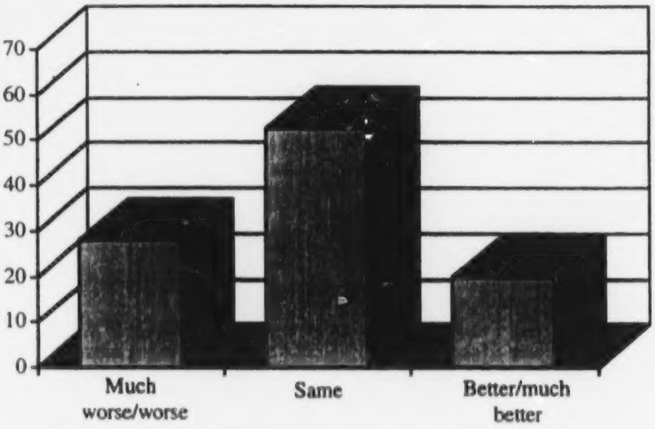
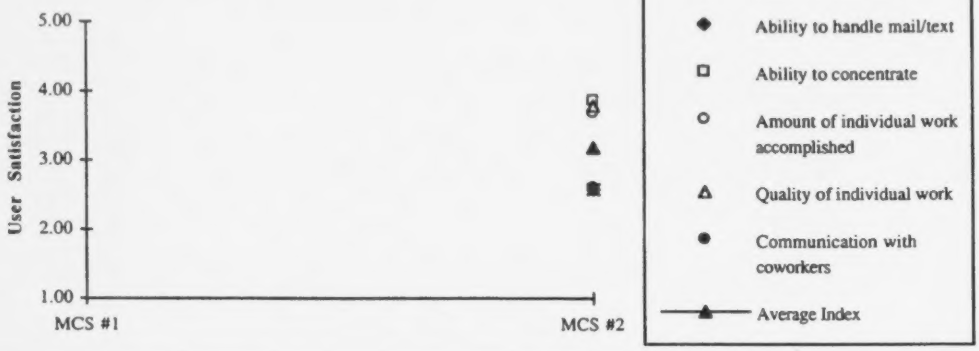


Figure 63: Home Index



The majority of users (over 70%) also rated access to technology in the office and ability to handle mail/text from home as "the same" to "somewhat better" in the new office environment, particularly in the second implementation (see Figure 62: Frequency Distribution for Access to Computers in Shared-Assigned Offices Across All MCS Projects). In the first implementation, dissatisfaction stemmed from difficulty locating available workstations (mentioned above).

Home Issues

The three issues that were grouped in the "home" category among the top ten issues overall were: access to technology at home, ability to concentrate at home, and quality of individual work performed at home. Amount of individual work, ability to handle text/mail at home, and ability to communicate with coworkers at home were also added to the index.

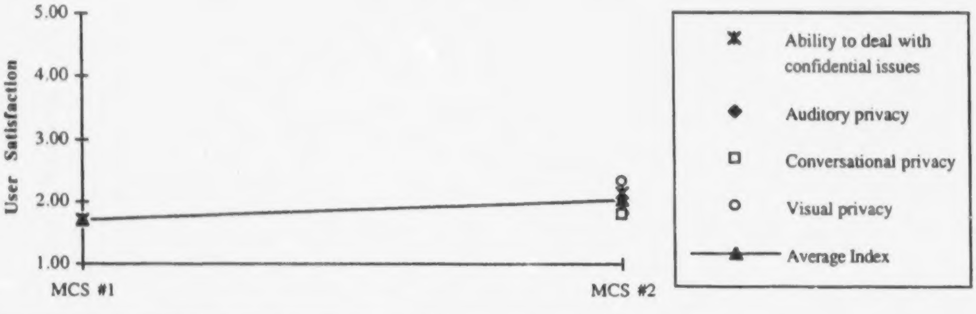
We emphasized that MCS did not promote work at home as an alternative to work in the office in the first implementation; this accounts for the absence of home-related satisfaction scores for this phase. For the second implementation, satisfaction ratings for home issues were much higher than those for any other category (see Figure 63: Home Index). In general, users rated home issues higher than in their previous office environment, particularly with regards to the quality and amount of work performed at home and ability to concentrate. Essentially unaffected by the implementation were users' ability to communicate with coworkers at home and access to technology at home.

Privacy Issues

Two issues among the top ten issues overall were grouped under privacy: auditory privacy in the office and ability to deal with confidential issues while in the office. The degree of conversational and visual privacy in the office were also added to the privacy index.

One of the tradeoffs involved in open plan environments is that users sacrifice privacy in exchange for more frequent and informal communication with coworkers. As a general rule, privacy issues tend to be rated low in open plan offices. The two MCS projects conformed to this rule.

Figure 64: Privacy Index



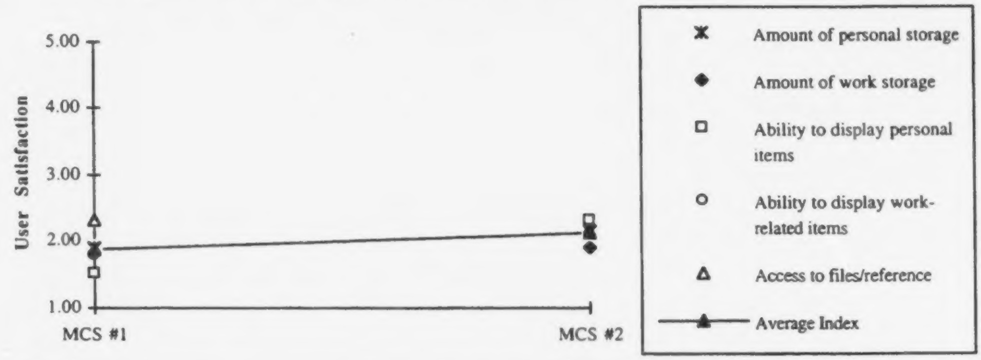
For both MCS implementations, privacy issues were rated "worse" to "much worse" than in the previous environment. Users commented that it was difficult to find private areas to deal with issues demanding confidentiality.

Storage/Personalization Issues

In the category of storage/personalization , the amount of storage provided for work-related materials in the office counted among the ten most important issues overall. Amount of personal storage, ability to display work and personal items, and access to files and reference materials were also added to the storage/personalization index.

User satisfaction with the ability to store materials and personalize workspaces was very low for both MCS projects (see Figure 65: Storage/ Personalization Index). However, users rated these issues very low in terms of importance; the loss of these activities did not have a profound effect on people's attitudes or ability to work in the new office environment. Storage for work-related materials, however, was one of the ten most important issues overall, and was also rated very low in satisfaction.

Figure 65: Storage/Personalization Index



In the first and second implementations, the amount of storage for work materials declined relative to the previous environment. If users failed to change their work behaviors to accommodate reduced storage (e.g., becoming more electronically-oriented and less paper-intensive), then a decrease in satisfaction with available storage would seem inevitable.

In the case of MCS #2, cost constraints compelled Facilities Management to greatly reduce the amount of storage available to users. The average index, however, was slightly higher in MCS #2 than in MCS #1, even though storage reduction was greater. This may indicate that users were becoming less paper-dependent and therefore required less storage than anticipated. Efforts to change work behaviors appear to have mitigated dissatisfaction with reduced storage.

Alternative Space/Design Issues

Issues grouped under this category included: informal meeting areas, informal break areas, dedicated project or team rooms, resource centers, and number and location of conference rooms. In addition, satisfaction with access to files and references was included in the index.

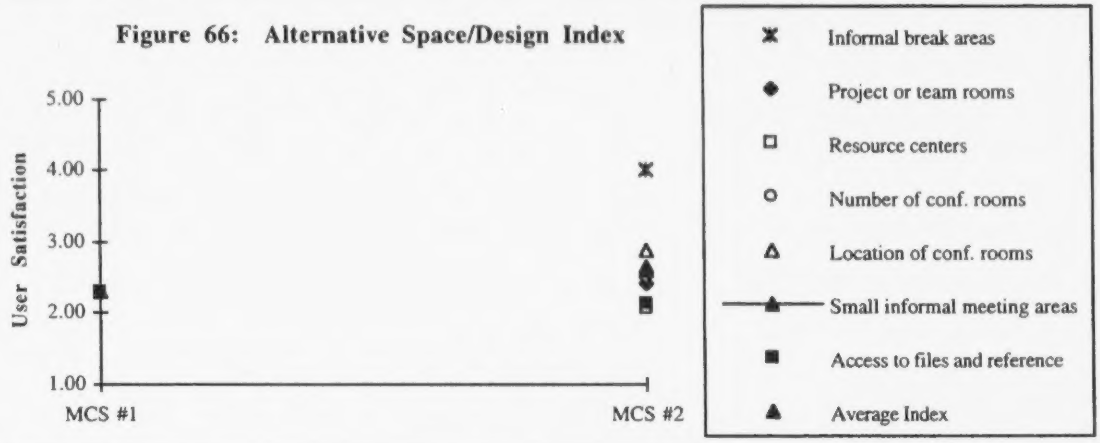
The design in both projects offered users very little variety in workspaces. Users were assigned to particular workstations, and were expected to work at the assigned locations (unless they were occupied by other "owners"). The second implementation included project team rooms and conference rooms in the original design. These features, however, were later converted to primary workstation areas because of cost and space constraints (see Appendix B).

The only alternative workspaces provided were informal break areas (one per floor) in MCS #2. User satisfaction with these break areas was rated higher than the previous environment (see Figure 66: Alternative Space/ Design Index). The satisfaction rating for informal meeting areas, however, was the same to slightly lower than for the previous environment. The informal areas were set up as break areas only, and were not conducive to work. Users rated informal work areas more important than informal break areas.

Many MCS users considered the lack of dedicated project or team rooms a problem. As mentioned above, the original design incorporated project rooms on each of the two floors at MCS #2. The final design did not include these features. The satisfaction was on average rated worse than what users had in the previous environment. Users commented that they had a difficult time finding adequate space to work on group projects, especially since the only group space available to them existed in the form of conference rooms located in an area outside of the MCS department area.

The advantages of the second implementation over the first were less apparent from the surveys than from personal observations. The second project focused on making the office environment more appealing aesthetically; increased sunlight in the office, better seating arrangements (i.e., "window seats") for those people who were required to work in the office most of the time, aisles that were clear of storage facilities, etc. In the second survey, users acknowledged the efforts made in these specific areas, but other factors more instrumental to meeting their business needs (e.g., voice and data communications, effectiveness in the office, etc.) suffered.

Figure 66: Alternative Space/Design Index



Overall User Satisfaction with the Shared-Assigned Offices and The Implementation Process

Ernst & Young accomplished impressive organizational learning between the first and second implementations. After researching their own project and comparing this with research done on other non-territorial offices, the Facilities Management department went back and identified its errors in the first implementation and tried to correct these for the second.

To summarize some of the changes in the planning and implementation process (see *Summary of Shared-Assigned Office Installations Across Time* for more details):

- More importance was accorded the overall planning process in the second implementation, including: encouragement by Facilities Management of departmental ownership; greater collaboration, more data collection on departmental occupancy patterns and space requirements; and greater efforts to include/inform users.
- Average space per employee declined from MCS #1 to MCS #2. Executive consultants and partners had smaller accommodations in Mcs #2.
- Emphasis on improving the overall comfort increased over time.
- Overall storage in the office decreased in MCS #2 through elimination of certain forms of storage. Alternatives were not provided.

- Break-out areas were added to MCS #2.

- Accessibility of equipment for inside and outside the office increased in MCS #2.

- The telephone system, when fully operational, offered direct dial capabilities, a great improvement over calls having to go through main reception.

Shared-Assigned Office Implementation Process

Applying the rating system described above (see IBM, UK's *IWSP "Rating" System for the Implementation Process*), the planning, design, and technology aspects of the two projects were scored and plotted. All aspects of the project increased over time; emphasis on planning, design, and technology in the second implementation was greater than in the first (see Figures 67, 68, and 69 on the following pages).

Overlaying these aspects of the implementation process with overall user satisfaction ratings, however, revealed that user response to the second implementation changed little, even though the implementation process changed a great deal. Although this seems to indicate that planning, design, and technology have little effect on user satisfaction, reassessment of the second project suggests:

- From the outset of the second implementation, Facilities Management tried to emphasize ownership of the project by MCS (one of the biggest problems in the first implementation was that the department had no ownership of the project at all). To do this, FM distanced itself from the project; it gave research materials to MCS on how to conduct the project, and then acted only to facilitate the design. MCS, however, lacked FM's knowledge base, and did not conduct the project as FM envisioned. For example, although FM stressed high user involvement, surveys and interviews indicated that users were generally poorly informed. The only user group formed was strictly representative; they had little to no influence on decision-making. This group was supposed to inform other users, but in actuality this "trickle-down" did not occur.

- On the surface the project was collaborative, but the final word rested with the partners. Many he suggestions put forth by the FM department and by the consultant were turned down by the partners because of cost constraints. As a result, MCS was not provided the variety of spaces recommended by FM and the space planning con-

Figure 67: The Planning Process for Ernst & Young Across All Implementations

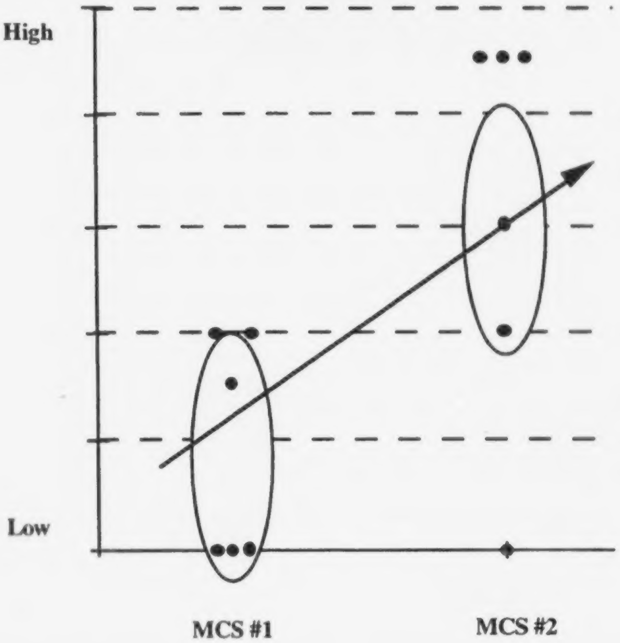


Figure 68: The Technology for Ernst & Young Across All Implementations

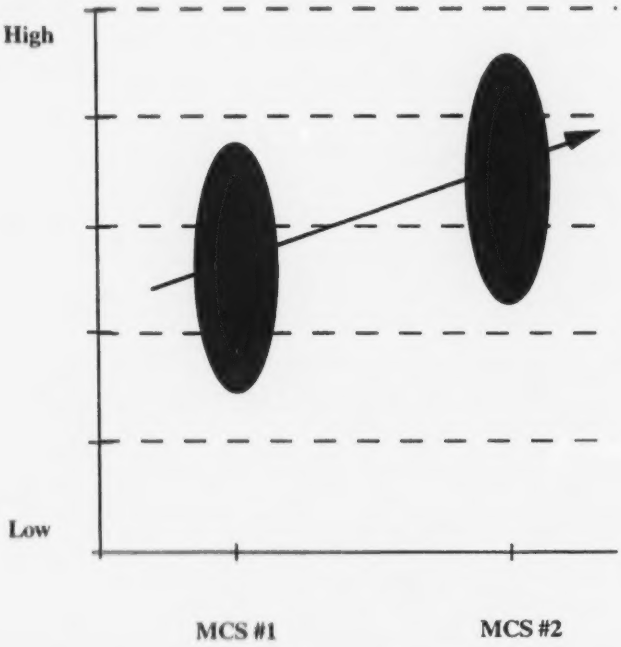


Figure 69: The Design for Ernst & Young Across All Implementations

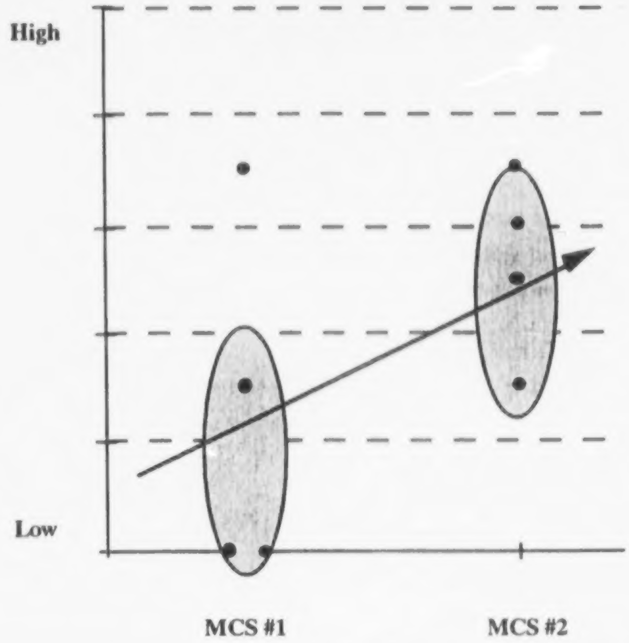
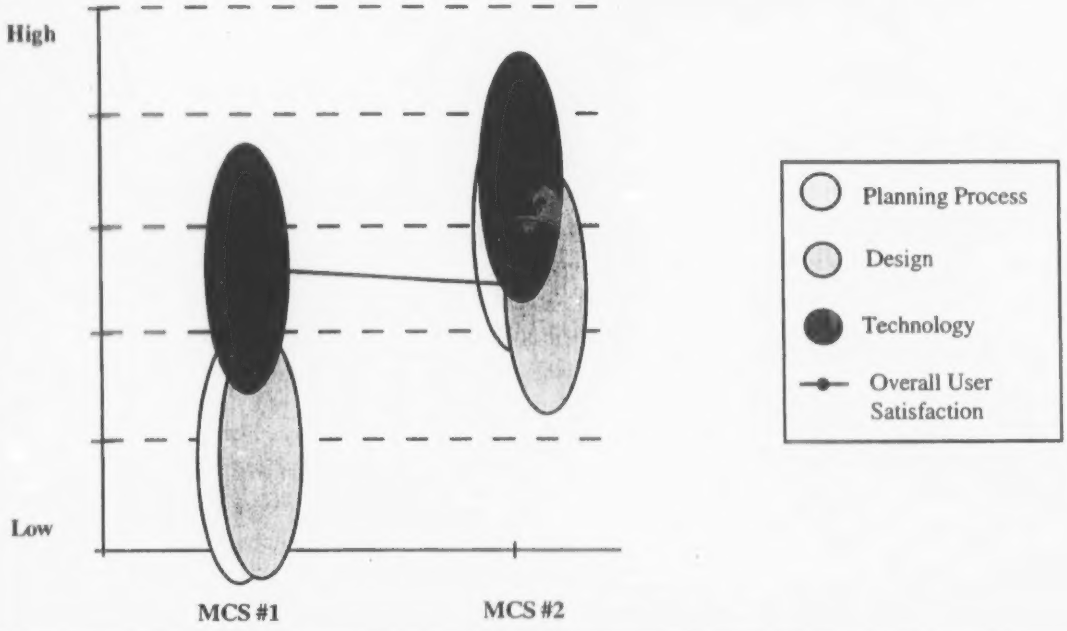


Figure 70: Planning, Design, and Technology Across All Ernst & Young MCS Shared-Assigned Office Implementations



sultant, nor did they have the recommended space per person, nor the ratios that were recommended as a result of the occupancy studies. Thus, although the different planning tasks were conducted, the information was not applied in designing the office.

- The most significant design difference between MCS #1 and MCS #2 involved aesthetics. The second implementation yielded an environment much more pleasing to the eye than the first. Storage was cleared from the aisles; more natural light permeated the office; overhead storage cabinets and high workstation panels were removed so that people could see one another. These design improvements, however, did not necessarily help employees to work more effectively.

- Informal break areas were also added in the second implementation, but users rated these areas relatively low in importance. Again, while these areas were agreeable, they did not necessarily help users perform their jobs.

- The new technology was not fully operational when users moved into the new MCS office. The telephone system did not work properly, and users quickly became frustrated with losing calls. In addition, some users had not been issued mobile equipment; flexible technology was purchased only as the department could afford it. As a consequence, many employees had to perform much of their work in the office.

Lessons Learned

Lessons learned from studying the shared-assigned offices at Ernst & Young included the following:

- Unless the members of a department/group/business understand how non-territorial or shared office environments are best implemented (e.g., the aspects of the implementation process that research has indicated is important to success), complete ownership by the department can undermine installation. The department(s) should own of the project, but may also need guidance or collaboration with others who are more experienced with the implementation of such environments.

- Users need alternative work settings, including places to concentrate and enjoy auditory privacy, both in and away from the office. The technology needs to support these alternative settings. Without project or "quiet" rooms or the ability to work at home, many users were forced to conduct most of their work in the open office. Often, work effectiveness diminishes due to noise, overcrowding, and other distractions.

- The work behaviors in the office did not change materially as a result of the new environment. Inefficient storage, overcrowding, and noise might not have been major problems if users had changed the way they worked. Not all users were supported by proper technology to change their work behaviors, but they were also not given training and support for working in new ways.

- In order to make the transition to the new environment as smooth as possible, all the technology and design of the office should be in place and operational before occupation of the location. A good "first impression" is critical; moving into a non-territorial or shared office environment in itself represents a major change to many people. If, in addition to working out use policies and other aspects of an open, non-territorial environment, employees are also fighting the technology, acceptance of the new way of working may be impeded.

- Impressive organizational learning occurred at Ernst & Young from the first to the second project. The FM department had the advantage of participating in both implementations; this is not the case in many independent initiatives. Unfortunately, learning was largely limited to the FM department; some mistakes identified by FM in the first implementation were repeated by MCS in the second implementation. Most importantly, the partners focused almost exclusively on cost reduction; they rarely made decisions on the basis of an integrated workplace strategy that was business- rather than cost-driven.

Conclusion

We discuss below each of the specific research questions identified at the onset of the ***Innovative Workplaces*** study with reference to Ernst & Young and shared-assigned offices. Later these questions will be discussed in more detail, with reference to all the organizations studied.

- *What factors (e.g., planning and design process, nature of technology, the design of the setting) tend to change the most as projects evolve?*

From the first project to the second, all the factors changed over time. Emphasis accorded the planning, design, and technology all increased with time.

- *What aspects of the new workplace system tend to become standardized or uniform?*

Little to no standardization in implementation occurred from the first project to the second. The workplace strategy, however, *was* standardized, and any refinements of the shared-assigned office strategy were systematically introduced.

- *As organizations expand their implementation of new workplace strategies (within or across sites) does employee response tend to improve, remain the same, decline, or is there no consistent pattern at all?*

Even though all aspects of the implementation appeared to change over time, user response to the shared-assigned offices remained about the same from the smaller to the larger installation. As discussed in previous sections, part of this unresponsiveness may be attributed to deficiencies in the implementation process; in particular, recommendations made on the basis of information generated in the process were frequently disregarded.

- *What differences are there in terms of cost and employee response (satisfaction, work effectiveness) as a function of whether the workplace system is primarily cost-driven versus business-driven ?*

Both Ernst & Young MCS projects were primarily cost-driven. As a result, user needs and demands were not necessarily addressed. According to surveys and interviews, users worked less effectively in the new environments.

- *What are the organizational implications of solution-oriented vs. process-oriented workplace systems?*

The MCS projects were also solution-oriented projects; FM and MCS knew they wanted shared-assigned offices and worked to fit users, design, and technology to this concept. As a result, the offices often did not support the ways in which employees wanted to or should have been working.

- *How does the implementation process change as the project moves from the pilot stage to widespread implementation? Is it necessary to focus as much attention on all three factors (design, technology, and planning process) in second and third installations to ensure similar success patterns as those achieved in the pilot project?*

As with the IBM SMART implementations, the Ernst & Young projects both tended to ignore end user involvement in the implementation process. As less and less attention was accorded to this component, the environment became increasingly detached from users' actual needs and work patterns.

- *What is the nature of organizational learning that occurs as a function of whether the workplace system is process- vs. solution-driven, cost- vs. business-driven, or part of a strategic initiative versus an independent initiative?*

As mentioned in the "Lessons Learned" section (see p. 146), a great deal of learning occurred from the first to the second implementation. We did not expect independent initiatives to demonstrate such marked organizational learning. The participation of the FM department in both implementations had much to do with this learning process.

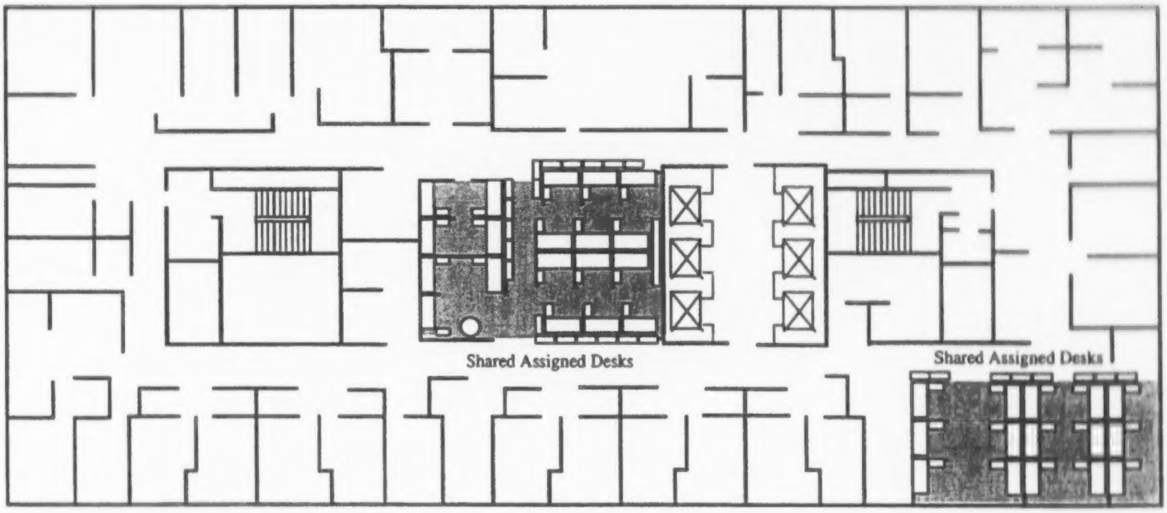


Figure 71: Floorplan of Ernst and Young MCS #1

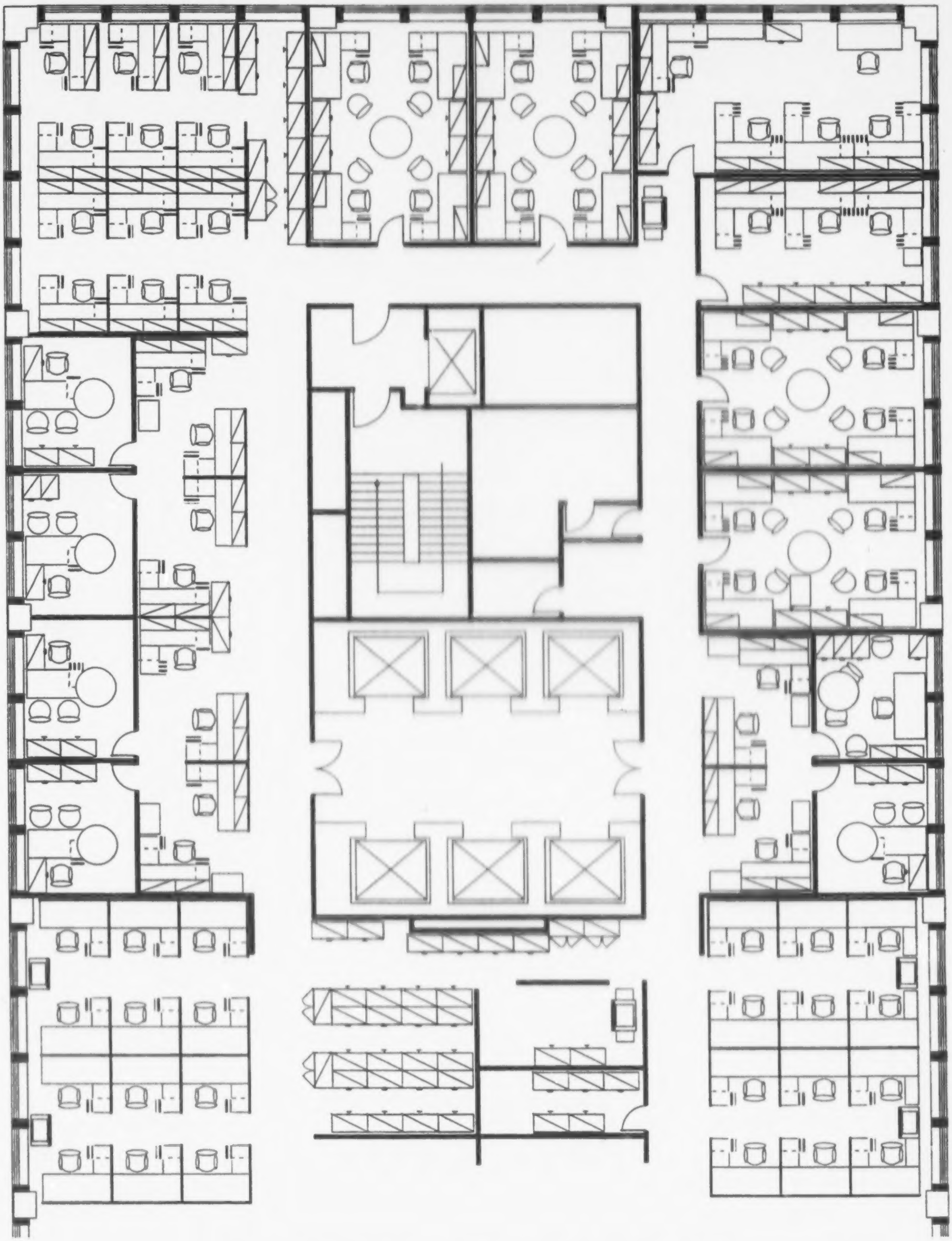


Figure 72: Floorplan of Ernst and Young MCS #2

DECsite, Digital Equipment Corporation Stockholm, Sweden

Workplace Strategy Overview

Digital Equipment Corporation has a long history of flexible working internationally. The first site studied by the IWSP was the original "Office of the Future" in Helsinki, Finland in 1989.[11] Digital developed this non-territorial office in an attempt to stimulate informal communication and team work. Since that time, we have uncovered numerous examples of flexible offices (and attempts at such) throughout Digital, with variations appearing in Sweden, the United Kingdom, and the United States.

Although sites throughout Europe and the United States were implementing flexible offices at similar times, the projects were independent initiatives. Each site took responsibility for the type of environment that they created, and had little to no influence from previous implementations. The closest example of a strategic initiative occurred in the United King-

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[11] Becker, F., Sims, W., and B. Davis, 1991.

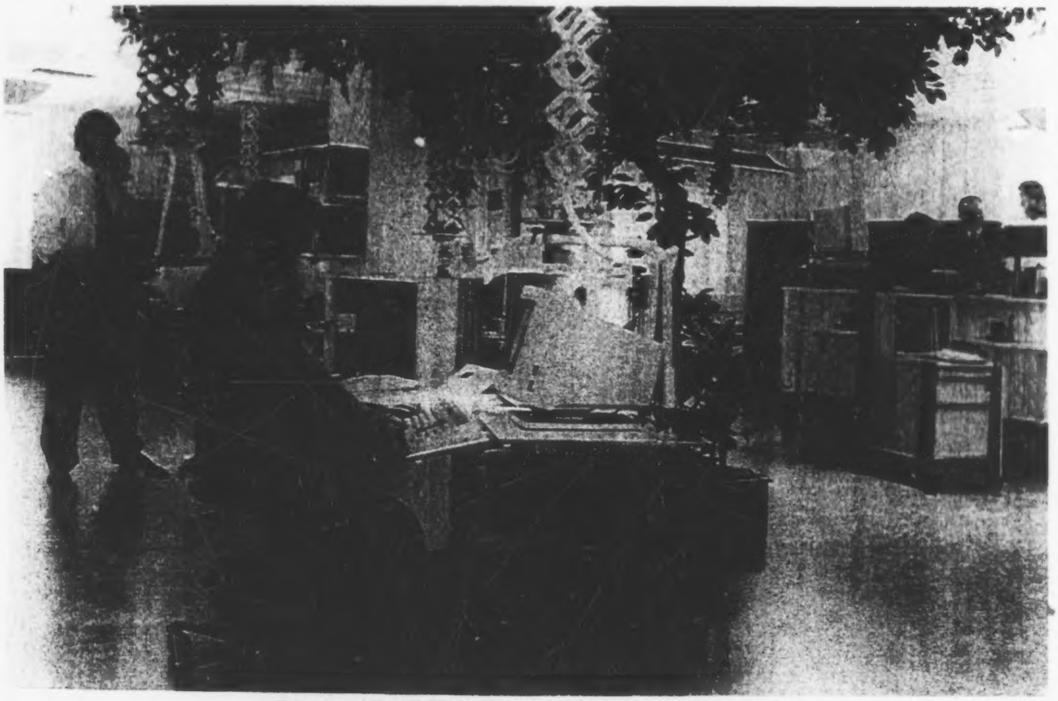
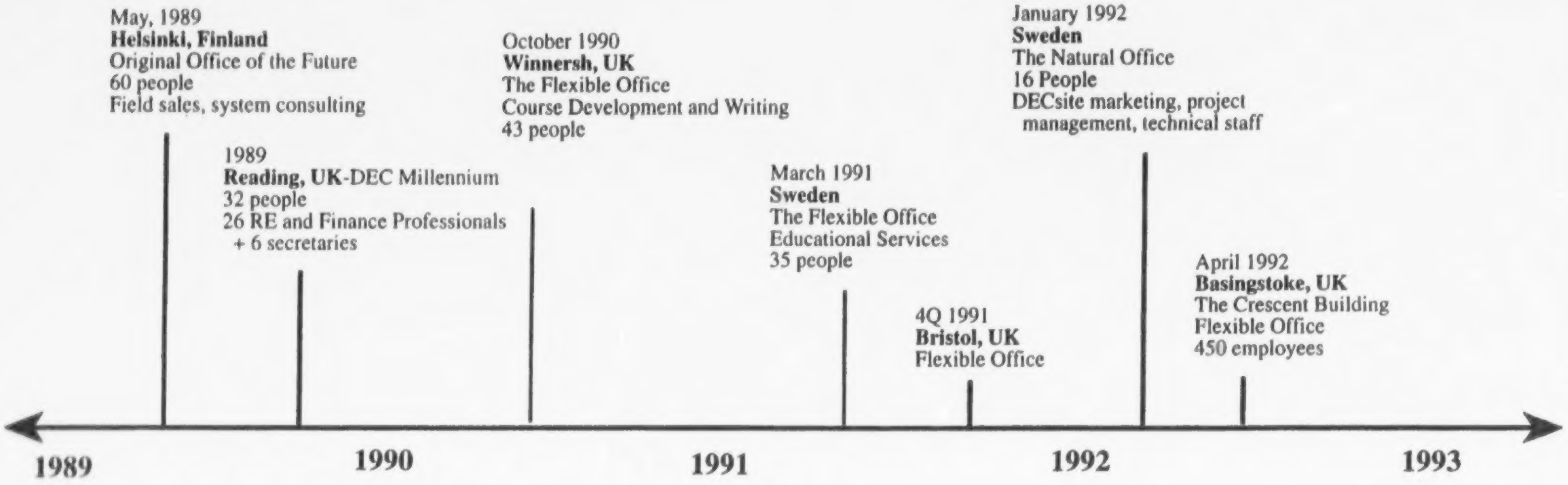


Photo 17: DEC Stockholm Overall Office

Figure 73: Digital Equipment Corporation Timeline


May, 1989
Helsinki, Finland
Original Office of the Future
60 people
Field sales, system consulting
1989
Reading, UK-DEC Millennium
32 people
26 RE and Finance Professionals
+ 6 secretaries
October 1990
Winnersh, UK
The Flexible Office
Course Development and Writing
43 people
March 1991
Sweden
The Flexible Office
Educational Services
35 people
4Q 1991
Bristol, UK
Flexible Office
January 1992
Sweden
The Natural Office
16 People
DECsite marketing, project management, technical staff
April 1992
Basingstoke, UK
The Crescent Building
Flexible Office
450 employees
1989
1990
1991
1992
1993

dom. A single UK group, called "People for the 90's," formed to help sites design and implement new flexible workplaces.

Figure 73 describes the sequence of events for the different office innovations at Digital Equipment Corporation.

Digital has been in Sweden since 1967. In 1985, the DECsite group was formed to sell network technology, environmental controls for computer rooms, and office concepts and technology. The group was originally based at the headquarters building (The Allen Building) in Stockholm. In 1988, the group moved to a different building in Sweden. This new location, however, was too far removed from the clients to be of much service to the DECsite group. In 1991, it was decided that the group would return to the Allen Building, with a proposed move-in date of January 1992.

One of the DECsite group's responsibilities included implementing client computer rooms. The department was therefore familiar with design, ergonomics, and technological support. The move back to the Allen presented the perfect opportunity to implement some new ideas in their own environment.

The Workplace Philosophy

The name of the DECsite office in Sweden is "The Natural Office." The name gives insight as to the philosophy behind the office; creativity and innovation are not necessarily limited to the office , often occurring away from the office in more relaxed, comfortable settings. An idea does not necessarily occur in the office between the hours of eight and five, but can occur at the dinner table, in the shower, while watching television, while skiing, in the middle of the night, or in any variety of locations or times. These ideas or inspirations often occur more frequently out of the normal hours and out of the office than they do in.

Goals/Drivers of The Natural Office

- *To create a comfortable, ergonomic environment that would enhance communication.*

Drivers of the Non-Territorial Office

The driver behind the Natural Office was to create a comfortable, ergonomic environment that would enhance group communication. As the concept evolved, additional drivers included work mobility and effectiveness. The project was not driven in any way by cost reduction, although there were some cost constraints (the project had to be reasonably priced).

Principles of The Natural Office

- *Employees owned a mobile workstation that they could place in any location in the office.*
- *Did not own the space, but owned the workstation.*
- *Designed to maximize economy, efficiency, energy, and ergonomics.*

The Four "E's"

The intent behind the office was to maximize what the DECsite group refers to as "the Four 'E's:' economy, efficiency, energy, and ergonomics.

Economically, the office had to adhere to certain cost guidelines, but was to primarily business-oriented. The Natural Office reduced the office space from 4650 sq. ft. to 2150 sq. ft.—a move from approximately 388 sq. ft. per person to 135 sq. ft. per person. The office cost $635 thousand Swedish Kroner (approximately $85,000 U.S.): 335 thousand SEK ($43,580 U.S.) for the furniture, and 300 thousand SEK ($41,420 U.S.) for the raised floor, linoleum, walls and other refurbishment. Management estimates that this cost is higher than for a traditional Digital office. An increase in productivity of 20%, attributable to the new way of working, countermanded the added cost.

The office concept later spread to other departments in the Allen Building. In one such project, a space reduction of 330 sq. ft. per person to 160 sq. ft. per person was achieved.

Increased efficiency was also among the goals of the new office. DECsite designed the office to increase both individual and group efficiency by allowing frequent communication through eye-contact and impromptu meetings. By installing a completely "mobile office" where employees could move their desks to any location, work in a variety of settings, and use cordless telephones to retrieve telephone calls anywhere in the building, DECsite increased employee accessibility both internally and externally.

Another key factor was ergonomics. Employees wanted the freedom to work not only in a variety of locations, but also from a variety of positions (e.g., standing up, sitting down, reclining, etc.). Employees wanted a safe environment, reducing occupational hazards as Carpal Tunnel Syndrome, headaches associated with lights or terminals, noise pollution, and physical problems associated with improper furniture.

The DECsite group also wanted the office to address energy conservation issues. The new environment to included features to reduce energy costs and usage, such as automatic shutdown of terminals and lights, increased use of natural lighting, etc.

As mentioned above, the Natural Office was both an independent initiative and a business-oriented strategy. The project was also solution-oriented; the manager knew how he wanted the office to look and encouraged users to focus on these specific concepts.

Summary of The Natural Office Installation

Unlike the multiple projects studied at IBM, Ernst & Young, and the Shimizu Institute of Technology, only one site was studied at this organization. Because there is only one site, the case study of The Natural Office has been incorporated in the summary of the installation. This write-up differs from those of the multiple site organizations, where the summary section compares the different sites in more general terms, while more detailed case studies were included in the Appendix.

Methodology

The same profiles applied to the other four sites were also applied to the Natural Office. The profiles act as a summary of the planning process, design, and technology, rather than a comparison across multiple sites, since only one site was studied.

Implementation Process

Before moving to the Allen Building in 1992, the DECsite department worked in individual or shared offices. The department had difficulties communicating effectively because people had problems locating one another. The manager of the group knew this was an inefficient means of conducting business, but did little to alter the situation because they were going to be moving shortly. Nonetheless, he directed plans for change at the new office location so that inefficiencies would not be repeated.

DECsite began modifying work behaviors for a mobile environment. Employees participated in an existing program at Digital, called the Personal Effectiveness Program (PEP). This program instructed people on how to work more effectively, a primary component of which includes paper reduction strategies. Applying some of the lessons learned from the program to their everyday work lives, employees began devising strategies for how people, technology, and the environment could work together to create a more effective workplace.

In June of 1991, six months before the group moved to the Allen Building, the entire DECsite group went to the Swedish Archipelago to discuss, among other things, the design of the new office. This trip, however, proved to be unsuccessful; the group was too large and too diverse in its opinions about how the office should be designed and implemented. The trip was meant to be a brainstorming session, but people were shutting each other down instead of being open to all ideas. Some of the members adamantly believed that the open environment would not be successful, so they only presented "traditional" ideas, while others felt that the open environment was the only way that the group could function effectively, and thus proposed more "radical" ideas.

It was decided at this large group meeting that a smaller group of four people should be formed to coordinate the design of the new office. The smaller group was comprised of representatives of four job types: managers, secretarial, project leaders, and sales.

The first achievement of this smaller group was a consensus on where and how they wanted to work. The group decided on four symbolic locations in which they thought they would be most creative: the garden, the golf course, the beach, and the archipelago. These four areas became the central theme of the office design.

The small planning group then began meeting with architects and other experts to address issues such as lighting, ergonomics, HVAC, air quality, etc. The small group brainstormed for additional office design ideas and came up with a plan of how the office should look. A large portion of the furniture had to be designed specifically for the office.

In September of 1991, the entire DECsite group again went on a trip, this time to Denmark. On this trip, the sketches for the new office were shown to the group. The response to the design was mixed: approximately 25% did not think the new office would work, about 25% were strongly in support, the remaining 50% were somewhere in the middle. The manager made the executive decision to continue with the office according to the sketches and plans, even though all DECsite members did not agree with the office design.

The group moved into the new building on January 15, 1992. At that time, the office was not fully functional. The office was designed to be a totally mobile office, with computers mounted on flexbars that could be pulled down from the ceiling (see design section below) and cordless telephones. The computer flexbars had not been installed, so computers were mounted on desks. The telephone system caused some problems, and, like in almost any new office, employees experienced general teething pains.

The official opening of the office was in May of 1992. By this time, the design of the office was finished, and the group had had time to establish rules for using the space; how to stored group materials, appropriate office behavior, etc.

The Planning Process

The six major areas identified as important in the process of planning new office environments included: project ownership by the business/department/group ; data collection on work time-activity patterns; collaborative, cross-departmental involvement; end user involvement; informing users; and training. Figure 74 summarizes our findings for the DECsite office.

Project Ownership

DECsite completely owned The Natural Office. The 16-member DECsite department originally worked on the office concept as a complete group. The small planning group was formed only after problems arose in reaching consensus and moving forward with the project in the large group. All ideas for the design—furniture, open office, technology, etc.— came from either the large or small group.

Project Teams/Committees Established

As mentioned above, the primary planning committee was the small planning group. Members of the group were selected from a pool of volunteers by the group's manager.

Figure 74: DECsite Natural Office Planning Process

		The Natural Office
Project Ownership:	Departments/Groups/Businesses	●
Groups/Teams/Committees:	Steering/Planning Committee	●
	User Representatives (non-managers)	●
	Managers	●
	Other	○
Collaborative Team Project:	Departments/Groups/Businesses	●
	Facilities/Premises Management	●
	Space Planning Consultants	○
	Management Information Systems	○
	Human Resources	○
Data Collection:	Occupancy Patterns for Group/Site	○
	Needs Analysis for Group/Site: Space	○
	Technology	○
Method of Informing or Involving End-Users (non-managers):	Workshops	○
	Seminars	○
	User meetings	●
	Bulletins/Newsletters	○
Training:	Office Use/Behavior/Technology	●

○ Did not have
● Did have
▨ Occurred post-implementation

Collaborative Team Effort

This project was not collaborative across departments in Digital. DECsite solicited some outside consultation in areas like new furniture design, HVAC, and drawing up plans, but the group planned and designed the majority of the project. Members of this group, however, were unique in that they possessed many of the skills that they would have needed to contract (e.g., ergonomics, technology, HR, etc.). Because they already possessed much of the expertise, they felt they could do the job faster and more to their expectations than if they consulted outside groups.

End User Involvement

While the planning committee was made up of end users across job types, the majority of users were not involved in any way in the planning and design phases. After the first large group meeting, end users not on the planning committee were not involved with the planning until the drawings were revealed in Denmark. At this point, users could not influence the design of the project.

Data Collection

No data was collected on the DECsite group work patterns.

Training

Before moving into the new office environment, all DECsite employees participated in the Personal Effectiveness Program (PEP). One outcome of the PEP program was that employees greatly reduced the amount of paper they brought with them into the new office. Another outcome of the PEP program was that employees began modifying their work behavior before they ever moved. Employees began thinking about how they conducted their business before working in the Natural Office.

Summary of the Natural Office Planning Process

To briefly summarize the nature of the planning process:

- The entire group participated in the PEP program, which encouraged employees to question traditional work patterns and behavior.
- The DECsite group went on a trip to the Swedish Archipelago to discuss how they could change their working environment in line with some of the concepts they had learned from the PEP program.
- A small, four-person planning committee was formed to plan and design the project.
- Outside consultants were solicited to help with things like HVAC, furniture design, and drawings.
- The final plans were revealed to the entire DECsite group in Denmark.

- The group moved into the new building six months after the first large group meeting.

- The office officially opened four months after occupying the office to allow employees time to develop rules and regulations for using the office, as well as work out "teething pains."

Design

Office Area

The office incorporated the four working locations originally identified by the planning group as the areas that they thought they could work most effectively: the beach, the golf club, archipelago, and garden. In the center of the room stood a "garden island" depicted by a large artificial tree with branches extending along the ceiling. Hanging from the limbs were pieces of fruit which were the means by which computers were accessed: pressing a button on the fruit resulted in a computer, attached to the ceiling by means of a "flexbar," descending from the ceiling. The computer could be adjusted to any height the user desired.

Photo 18: Overall DECsite

The floor tile patterns helped to depict the four geographical areas throughout the office. The artificial tree was surrounded by green linoleum to create a garden effect. The green linoleum changed to beige linoleum to depict sand on a beach. The beige linoleum then ran into blue to depict the surrounding ocean.

Photo 19: DECsite Conference Room

In addition to the open space for workstations under the artificial tree, the main section of the office also had a conference room, secretarial station, and lunch/eating area. The conference room was located on a raised platform at one end of the main room and was surrounded by glass. The conference room was designed according to the "golf" theme, with a putting green, golf hole and flag in one corner.

The secretarial station, also a raised platform, was designed to give the secretary a clear view of all the employees and to reinforce the concept of the secretary as "Commander of the Ship." This design concept also dealt with status in the office; the raised platform allowed the secretary to talk to people at eye-level, instead of having to look up to talk to a standing person.

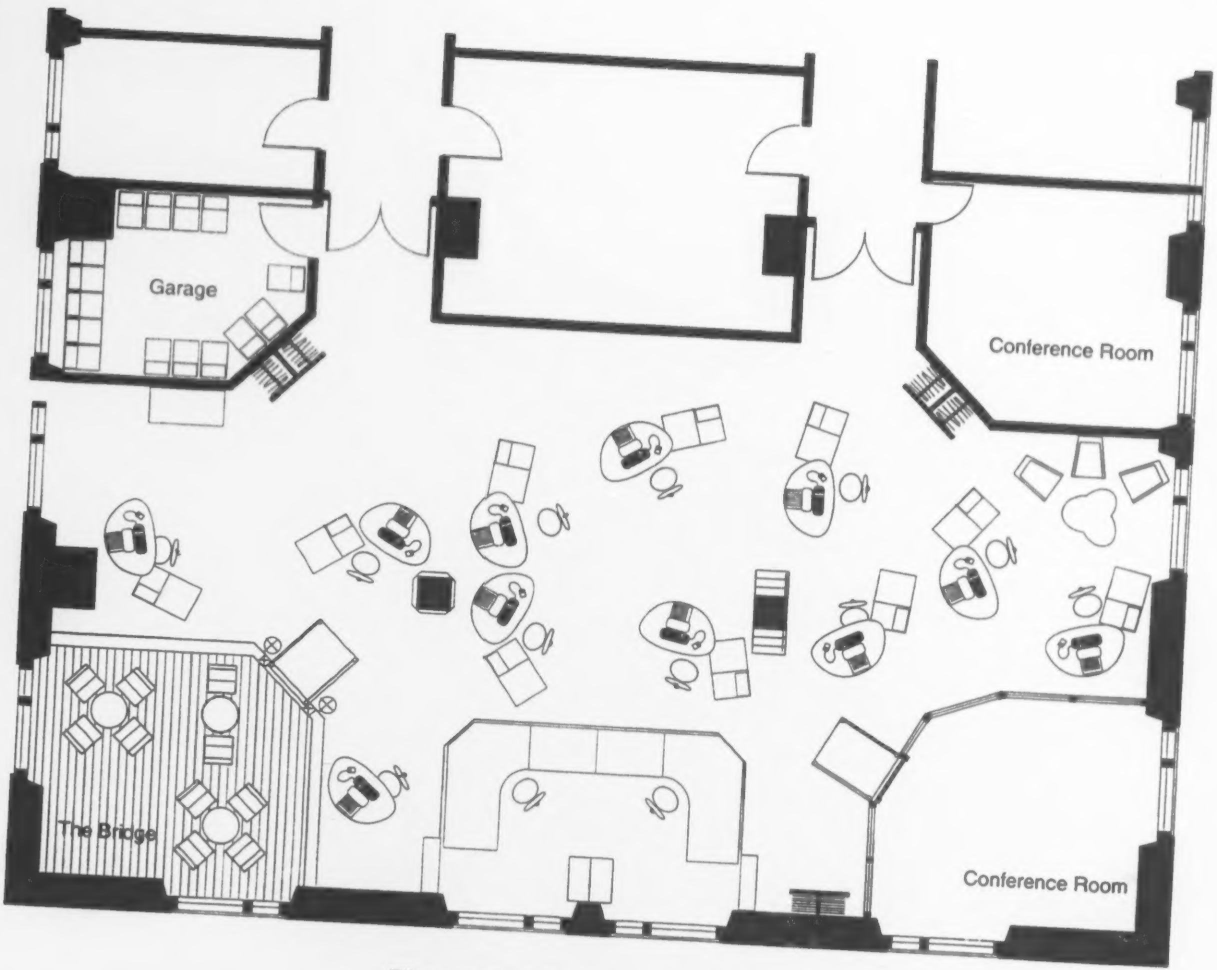


Figure 75: Floorplan of DECsite

The informal eating area was designed similar to the bridge of a ship. The "deck" contained outdoor tables and chairs for employees to relax, conduct small meetings, or to eat. The eating area was surrounded by wood paneling, with "portholes" added in the design. A map of Denmark and Sweden constituted the backdrop for one of the artificial windows.

Furniture

The furniture throughout the office was based on functionality, not aesthetics. Chairs in the conference room allowed users to sit or recline. The chairs in the remainder of the office were designed according to ergonomic studies, and allowed users to either sit with support on the knees or from a variety of other positions.

Photo 20: DECsite Secretary Station

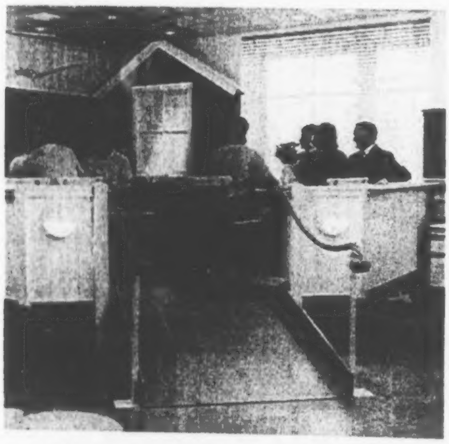


Photo 21: DECsite Cafe Area

Photo 22: DECsite Mobile Workstation

All workstations, including the permanent secretarial workstations, were height adjustable.

Workstations

Users were provided with a number of different workspaces. The primary workstation consisted of a mobile desk that could be moved anywhere in the office. This "caddy" folded out to be a fairly large desk. The caddies allowed users one file drawer and two smaller drawers for storage, as well as binder storage. If a user wished to work on a computer at his/her workstation, (s)he needed only to wheel the caddy to the desired location and pull down a computer from the ceiling. The caddies were stored in a "garage" in the evenings or when the users expected to be out of the office for extended periods of time.

These mobile caddies made the Natural Office a unique form of non-territorial office compared to the other sites studied. Users actually "owned" their own desk, but they did not own the space that the desk occupied. In most non-territorial offices we examined, users did not have ownership of anything beyond designated file storage. The mobile pedestals gave users their own "sense of territory."

In addition to the primary workstations, users also worked at the secretarial station, the informal eatery, the conference room, or another informal meeting area with a small table and "spider" chairs. If the user desired a more private area in which to work, an additional quiet office was located near the garage.

Storage

Users were given three drawers on their caddies to store personal work items, as well as surface space on the caddies for items such as binders or other oversized articles. In addition, users were given one meter of shelf space each in the "garage" for items they did not want to store in or on the caddies.

Overall Design

The major goal of the design of a work environment is to support the ways in which people work. For non-territorial offices, some of the major attributes that help users work more effectively include:

- Multiple forms of work areas to support different tasks, such as concentrative work, team projects, small meetings, etc.
- Adequate storage for both personal and work related materials.
- Flexibility in design to handle peak periods and growth in the department (both temporary and permanent).
- Common areas for meetings (formal and informal) and break-out areas for relaxation.
- Surroundings encouraging communication, collaboration, and exchange of ideas without negatively impacting the productivity of the group.

Figure 76: DECsite Natural Office Design describes some of the physical attributes of the DECsite office.

Multiple Workstations

As mentioned above, users were assigned a personal mobile workstation.

All of the workstations were, in essence, height adjustable. The secretarial bridge workstations was adjusted by raising or lowering the actual workstation. The primary workstations were height adjustable in that the computer terminals could be placed at any height through use of the flexbar. Computers descended from the ceiling to the desired height.

One private workroom was originally allocated to the Natural Office—in addition to the conference room— for private work. This room was supplied with a desk (stationary), chair, and terminal. Later, some members of the group felt they needed additional private rooms, so one more room was allocated to both the DECsite group and the other departments on the floor.

Storage Alternatives

As mentioned above, the caddies provided the users with three drawers and binder storage. Users were also given one meter of shelf-space in the garage for items that could not be stored in the caddy.

Common Areas

The Natural Office was designed with many common areas for work-

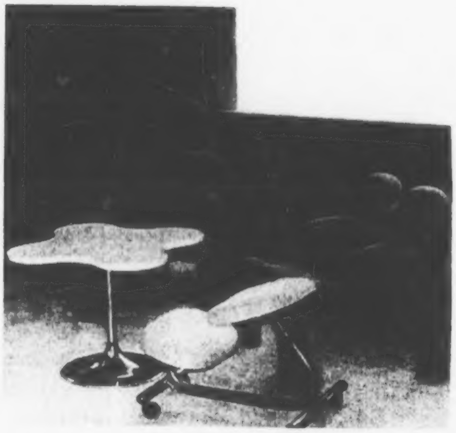


Photo 23: DECsite Informal Area

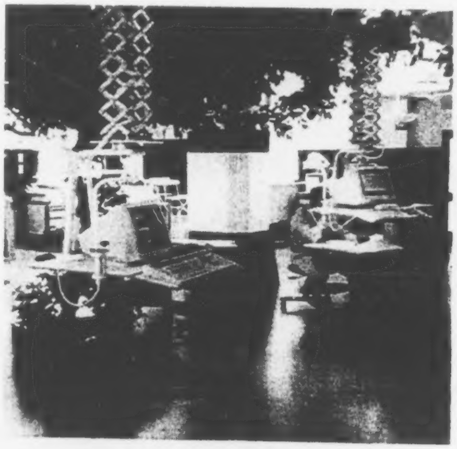


Photo 24: DECsite Office Area

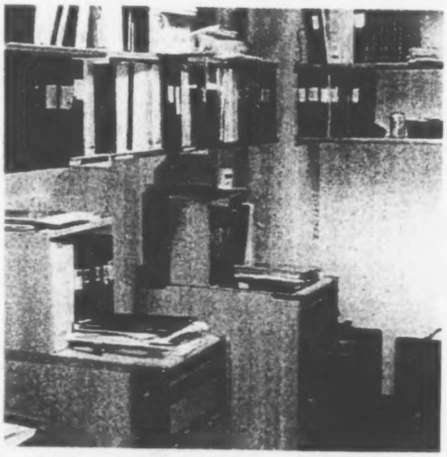


Photo 25: DECsite Garage

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[12] Scott, P. (1992). The Natural Office. England: Digital Equipment Corporation.

Figure 76: DECsite Natural Office Design

		The Natural Office
Multiple Workstations:	Primary (mobile) workstations	●
	Adjustable height workstations	●
	Work rooms/Quiet rooms	●
	Partner office accessible if unoccupied	○
	Dedicated visitor workstations (dept.)	○
	Dedicated visitor terminals (location)	○
Storage Alternatives:	Mobile pedestals	●
	Personal shelf-storage	●
	Mid-level storage cabinets	○
	Overhead storage areas	○
	Floor-to-ceiling common storage areas	○
Common Areas:	Conference Rooms	●
	Break-Out Areas	●
Design Considerations:	Ionizer	●
	Theme	●
	New furniture	●

○	Did not have
●	Did have
▨	Occurred post-implementation

related purposes and relaxation. The area held an informal eating area, a conference room, and informal seating areas that could be used by anyone in the group.

Design Considerations

In line with the "Four E's," certain unique features were designed into the new environment:

- Lighting that automatically adjusted according to the degree of natural lighting in the office.

- An ionizer that prevented dust from settling on the equipment.
- A central symbolic office theme (the Swedish Archipelago) to help create a relaxing, stimulating environment.
- New, ergonomic furniture to allow employees a variety of positions from which to work.
- Background music to hide some of the office noise.

Summary of Design Over Time

To summarize the design of the Natural Office:

- Mobile workstations to allow users the freedom to work anywhere in the office.
- A variety of alternative spaces (conference rooms, informal seating areas, eating areas).
- Limited but adequate storage areas.
- Special features to maximize economy, efficiency, energy, and ergonomics in the office, such as automatic lighting and ergonomic furniture.

Technology

Three areas of technology important to the implementation of non-territorial offices included: technology available in the office; technology to support work outside of the office; and technology to support communication. Figure 77: Technology depicts the technology DECsite installed at the Natural Office.

The technology was centered around two main criteria: flexibility and comfort. From the computers to the telephones, the equipment allowed for the maximum mobility in the office and the ability to work in a comfortable fashion.

Office Technology

As mentioned earlier, computers were mounted to the ceiling via flexbars and could be adjusted to any desirable height simply by pressing a button on the decorative fruit. Users could work from a standing position or sitting position.

Figure 77: DECsite Natural Office Technology

		The Natural Office
Office Technology:	Increased access to latest PC	●
	Docking stations to link portables	○
	Access to printer, fax, modem	●
	Electronic diary/mail	●
Non-Office Technology:	Latest PC terminal	○
	Latest portable computer w/ modem	○
	Home Printer	○
	Fax	○
Voice Communications/ Telephone System:	Direct dialing number	●
	Voice mail/messaging	●
Special Technology Available to Users †:	Car telephones	●
	Customer site terminals	○
	Other	○

○ Did not have
● Did have
▨ Occurred post-implementation

† Equipment not part of standard technology package.
Available if user can justify the necessity.

Initially, eleven terminals were available for the sixteen users. This supply of terminals, however, was not adequate for the group (and additional people that used the office); additional terminals were later added. At the time this research was conducted—approximately 17 months after the official opening of the office—the office had 10 terminals and 4 PCs, in addition to two permanently mounted computers on the secretarial bridge.

An important factor in designing the office was employee health and comfort. The CAD/CAM machine was fitted with positive and negative ionizers to prevent dust from settling on the equipment and causing illness.

Non-Office Technology

Users were not provided with any non-office technology. At the time of this study, there were plans to equip users with laptop computers for use in and out of the office. Approximately 50% of the users had PCs at home, but these were not provided as a result of the new environment.

Photo 26: DECsite Computer on Flexbar

Voice Communications

The original telephone system consisted of cordless analog telephones that were assigned to each user. This system was limited, however, because of interference caused from too many frequencies and/or from sitting too close to the base. A new digital cordless telephone system was later installed that could be used anywhere in the building (except for the elevator), could be used close to any base without causing interference, and allowed for up to 160 users. Each user was issued an individual cordless telephone.

A single main line was also installed. Everyone was responsible for picking up this line by either answering one of the several permanently-based telephones or by pulling the call to their individual cordless telephones. One of the central columns in the building was modified to a "lighthouse" which alerted users to calls on the main line by flashing lights when the line rang.

E-mail

In addition to an e-mail system that allowed users to communicate with coworkers and clients, the system also enabled users to transfer their telephone calls to the switchboard operator. By entering in a series of numbers, users simultaneously transferred messages to the operator and left messages indicating why telephone calls had been transferred (e.g., "At lunch, back at 2:00").

Special Technology

Some users were given car telephones, but this was not part of the standard technology package. Users could request a car telephone from the manager.

Summary of Technology Over Time

To summarize the technology at the Natural Office:

- Adjustable-height computer terminals and PCs throughout the office.
- Cordless telephones that could be used anywhere in the building.
- Electronic mail for communication and to help facilitate telephone call handling.

Employee Satisfaction and Work Effectiveness

To understand the changes in the work environment and the effect these changes had on user satisfaction and effectiveness, the IWSP research team conducted a standard workplace survey at the DECsite location, as well as focus groups and interviews. This section presents some of the results of the interviews and surveys, and discusses user work effectiveness and satisfaction ratings in relation to the changes in the office system.

Table 19: Data Collection Techniques

Data Collection Technique	Total Number of People	Total Number of Locations
Cornell Workspace Survey	13	1
Focus Groups	7	1
Interviews	3	1
Personal Observation	—	1

Survey Background Data

User Profile

Job types of all the employees surveyed and interviewed fell into the following categories:

- sales;
- managers;
- secretary;
- financial specialist.

A large number (50%) of the users surveyed were in sales. Managers constituted the next largest group of users, with 33% of users falling in this category (see Figure 78). The only index for which these two job types differed was satisfaction with privacy. Managers rated their satisfaction lower than sales people (t= -2.475, df= 8, p= 0.0384), with means of 2.7 and 1.7, respectively.

Figure 78: Survey Respondents by Job Type

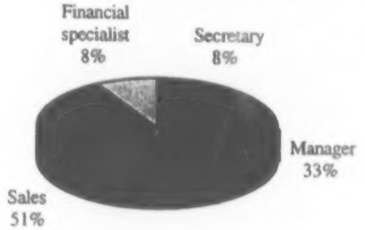


Figure 79: Survey Respondents by Age Group

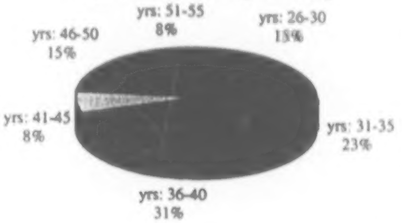
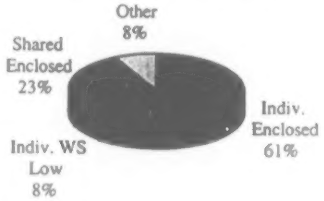


Figure 80: Survey Respondents Previous Workstations



The users tended to be young males (under the age of 40—see Figure 79). There were no statistically significant differences in survey responses by age groups.

The majority of users worked in The Natural Office since its inception in 1992 (77%). The remaining respondents had worked in the new office anywhere from 1 to 15 months. Most of the respondents worked in individual or shared offices before moving to The Natural Office (85%). Again, the survey responses were consistent across both the length of time users had been in the environment and their previous workstation design.

For more information on the survey and the rating system of the responses, please see the *Data Collection Methods* in the *Methodology* section on page 8. A complete survey can be found in Appendix D.

Benefits of The Natural Office

Users identified three main benefits of working in the Natural Office:

1) **Flexibility:** Users commented they had much more flexibility both in and out of the office. The mobile technology and workstations gave users the freedom to work anywhere in the room or building. In addition, workstations were easily moved together (or apart) to form small, temporary work teams. Although many users stated they only worked at home to supplement working in the office (rather than replacing it), the new office concept gave them the freedom to choose if they wanted to work in the office or elsewhere.

2) **Communication with coworkers:** The open environment and mobility afforded users facilitated communication. People could no longer "hide" when they came into the office, but had to interact with others (if even just brief greetings). People could now see when coworkers were in the office and could locate them quickly and easily.

3) **Overall better group dynamics:** Again, the openness and the mobility allowed users to communicate quickly and easily in the office, as well as to form instantaneous small work groups. In addition, the

office gave users a "charge" not present in the previous environment. For example, when a sales person landed an account, everyone in the office found out about it, and congratulated the person when they came back into the office.

Disadvantages of The Natural Office

Three main disadvantages/areas users identified were:

1) **Noise in the office:** Because of the open environment, people could overhear conversations or group meetings going on in other parts of the room, in addition to telephone calls and other noises such as background music. Interview and observational data suggests that the two to three private/quiet rooms were not used very often. One reason was that the design of the offices was very poor in terms of furniture, lighting, and general aesthetics.

2) **Being a "showcase," which inhibits the ability to make changes in the office:** Some users commented that, because their office was a showcase for the Natural Office concept, it was difficult to get any changes implemented. Part of these feelings could be attributed to people trying to revert back to their old office behaviors and not being permitted to by either fellow employees or managers.

3) **Too many visitors in the office (distractions):** Again, because the office was a showcase, many clients (and researchers) visited the office. These frequent visits, according to users, were disruptive, and also gave users the feeling of "working in a fish bowl." In addition, visitors often inhabited needed workspaces in the office (e.g., the conference room or quiet room).

Issues of Most Importance to Natural Office Users

Users were asked to rate the importance of survey issues. The ten issues that, on average, were most important to all Natural Office users were:

- ability to receive telephone calls in the office;
- ability to make telephone calls in the office;
- access to technology at home;
- quality of individual work at the office;
- access to computers in the office;
- amount of group work performed in the office;
- access to coworkers in the office;
- ability to handle mail/text at home;
- quality of individual work performed at home;
- ease of concentration in the office.

Issues of Least Importance to Natural Office Users

The three issues of least importance were:

- ability to display personal items;
- amount of personal storage;
- ability to display work-related items.

It is important to note that user satisfaction/dissatisfaction did not tend to influence the importance ratings for an issue. The scattergram of satisfaction ratings compared to importance ratings below demonstrates that, although the satisfaction ratings tended to be higher than those of many of the other sites we examined, a number of items were rated low in importance.[13] For example, the comparison satisfaction rating for the opportunity to display personal items in the Natural Office environment versus the previous office environment was very low—only 1.92 (the lowest satisfaction rating for all of the issues). The importance rating, however, was also low with 2.31.

Issues of High Importance and High Satisfaction

Issues of high importance and high satisfaction included:

- ability to receive telephone calls in the office;
- ability to make telephone calls in the office;
- access to technology at home;
- quality of individual work performed in the office;
- amount of group work performed in the office;
- access to coworkers in the office;
- quality of individual work performed in the office;
- quality of group work performed in the office;
- productivity at home;
- communication with coworkers in the office;
- ability to receive messages when out of the office;
- communication with coworkers at home;
- availability of resource centers;
- ease of access to files and reference materials.

Interesting to note is that the number of survey issues rated by users as both high in importance and high in satisfaction was greater than the number of issues rated similarly for IBM and Ernst & Young (15 issues compared to 7 for both IBM and Ernst & Young). In addition, seven of the ten most importance issues were rated high in satisfaction (reasons for these differences in scores will be discussed in more detail in *Part I* of this report).

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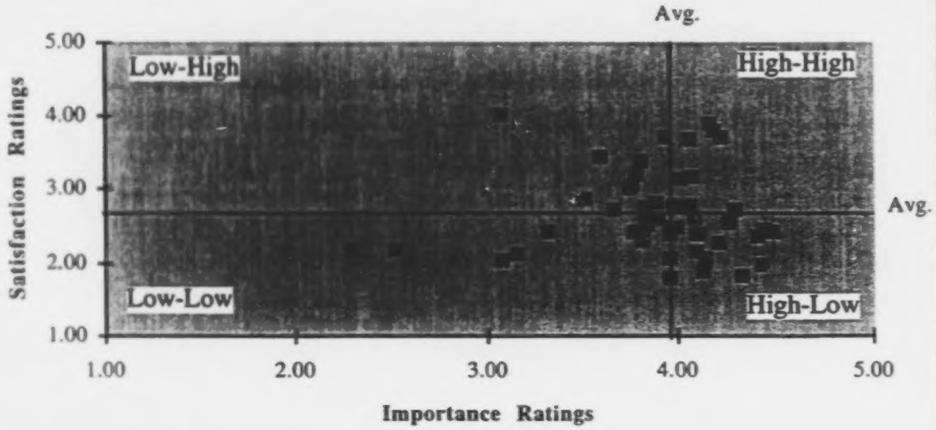
[13] Note: The importance of issues relating to the environment tended to be rated fairly high on the Workplace Surveys. For example, one of the lowest importance ratings was around 2.8. This was due in part to the limitations of the rating scale in the survey. The quadrants have been divided at the means of the importance and satisfaction means (versus at the median score of 3.0) to help clarify which issues were of most importance to the users.

Figure 81: Satisfaction Ratings Compared to Importance



Issues of High Importance and Low Satisfaction

Issues of high importance and low satisfaction included:

- access to computers in the office;
- ability to concentrate in the office;
- sense of being valued by the company;
- amount of individual work performed in the office;
- auditory privacy in the office;
- conversational privacy in the office;
- stress level at work;
- ability to receive mail in the office;
- ability to deal with confidential issues in the office.

Issue Indexes

In order the more clearly demonstrate the impact the new office environment had on user satisfaction and work effectiveness, the ten most important survey issues were grouped into seven major categories. These categories were:

- work effectiveness;
- communication;

- technology;
- home;
- privacy;
- storage/personalization;
- alternative spaces/design.

Again, the ten issues that, on average, were most important to The Natural Office users were:

- ability to receive telephone calls in the office;
- ability to make telephone calls in the office;
- access to technology at home;
- quality of individual work at the office;
- access to computers in the office;
- amount of group work performed in the office;
- access to coworkers in the office;
- ability to handle mail/text at home;
- quality of individual work performed at home;
- ease of concentration in the office.

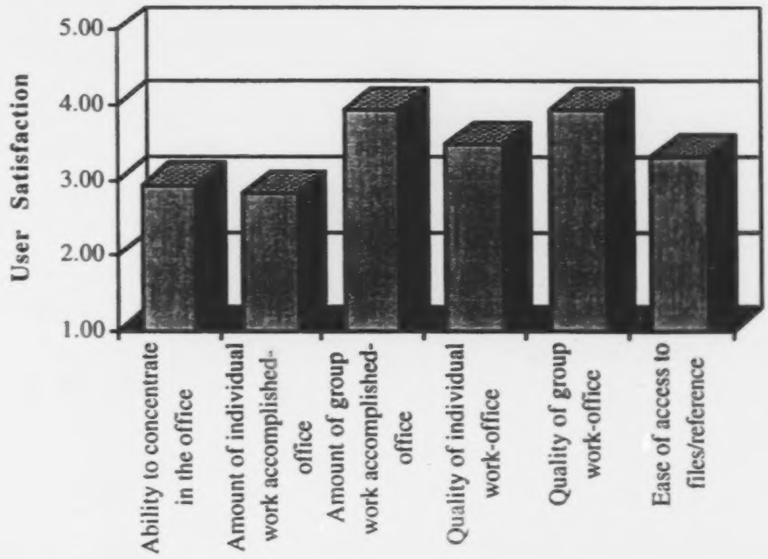
The satisfaction ratings for ten issues, plus the satisfaction ratings for additional issues that were added to give a better description of the system according the seven categories, were graphed. An average of all the issues was also graphed to show the satisfaction rating in more general terms.

Work Effectiveness Issues

Three issues among the ten most important grouped under work effectiveness were: ease of concentration in the office; quality of individual work accomplished in the office; and amount of group work accomplished in the office. The amount of individual work accomplished in the office, the quality of group work performed in the office, and the ease of access to files and reference materials were also added to the overall index.

The work effectiveness issues were all rated fairly high, with an average index of 3.4 (see Figure 82: Work Effectiveness Index). Amount of work accomplished on an individual basis and ease of concentration appear to have suffered slightly. Group effectiveness, quality of individual work, and access to files and reference materials, however, were on average rated "better" to "much better" in the new environment.

Figure 82: Work Effectiveness Index



Amount of Individual Work Accomplished and Ease of Concentration in the Office

Amount of individual work accomplished and ease of concentration were rated lower than the other work effectiveness issues. Users mentioned that it was difficult at times to concentrate because of the number of visitors and the open environment . These factors could have also effected users' ability to perform individual work because they were distracted or interrupted from their work.

Group Effectiveness and Access to Files and Reference Materials

Amount and quality of work performed as a group increased in the new environment. Users easily located and worked with coworkers on projects, and no longer had to schedule meetings several days in advance. Users formed temporary work groups easily and instantaneously by positioning their workstations together to form a larger team workspace. In addition, users no longer had to search for their files and materials or go back to their offices to retrieve materials; the majority of their storage was located in their mobile pedestals. Instead of having to walk to their storage if they were working in different areas of the office, they simply brought their storage (and workstation) with them.

Communication Issues

Three of the ten most important issues to fall under the category of communication were: ability to receive telephone calls in the office; ability to make telephone calls in the office; and access to coworkers in the office. Communication with coworkers and managers, ability to receive messages out of the office, and ability to receive mail were also added to the index to give a more comprehensive representation of the communication index.

Communication with Coworkers and Managers

User satisfaction was rated higher on average than that of the previous office. (see Figure 83: Communication Index). Access and communication with coworkers and managers were relatively high, ranging from 3.6 to 4.3. Almost 95% of all respondents rated their satisfaction as "the same" to "better" (see Figure 84: Frequency Distribution for Communication with Managers in DECsite's Natural Office). Again, this increase was a result of moving from individually assigned enclosed offices to an open office environment. Users no longer had the physical and emotional barriers associated with status (e.g., walls, offices, etc.), and could communicate freely and easily.

Figure 83: Communication Index

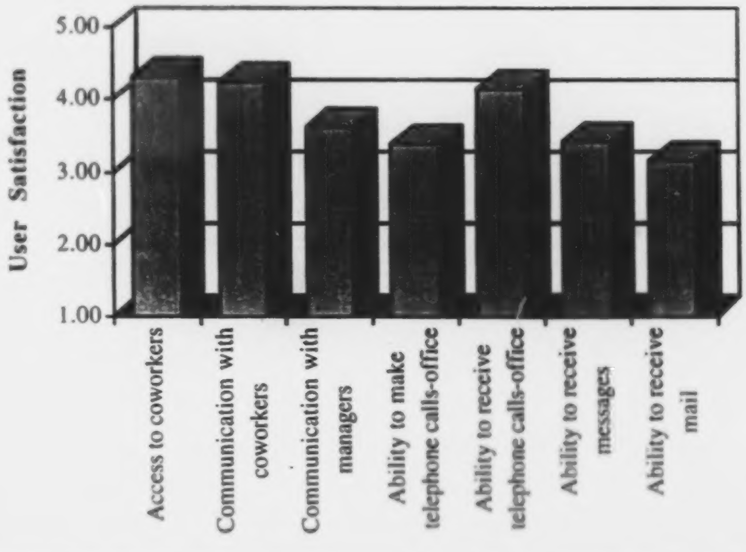
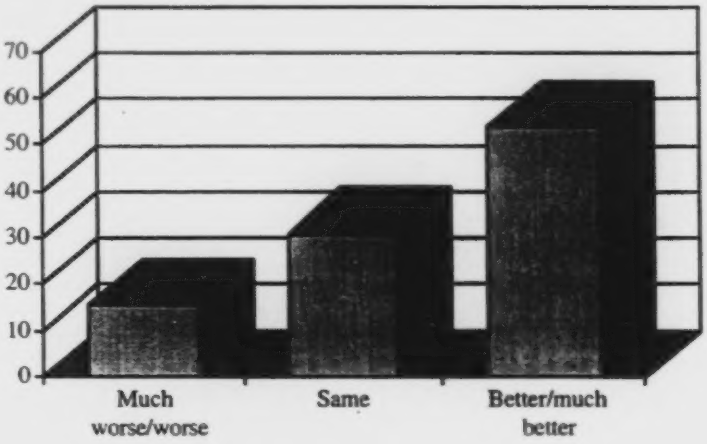


Figure 84: Frequency Distribution for Communication with Managers in DECsite's Natural Office



Telephone Communications

Telephone communications were also rated higher in the new environment. The new digital telephone system not only allowed users to make and receive telephone calls from anywhere in the building, but it was also linked to the computer system. Users transmitted messages to the computer system, such as "At lunch until 1:30," by pressing a code into the telephone.

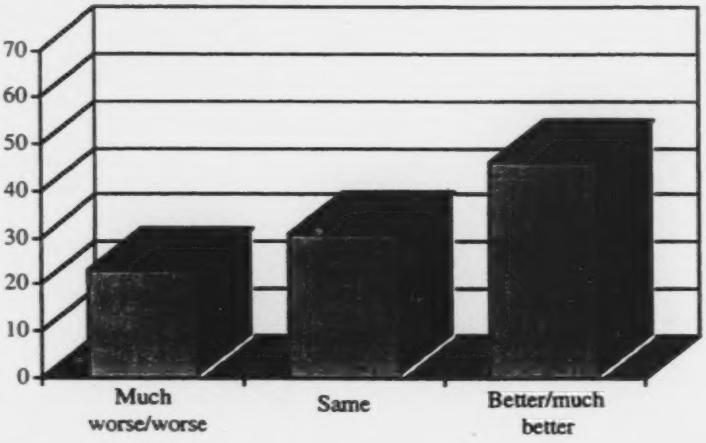
Ability to make telephone calls in the office, while rated fairly high, was one of the lowest communication issues. Only 45% of all respondents rated this issue as better in the Natural Office (see Figure 85: Frequency Distribution for Ability to Make Telephone Calls in DECsite's Natural Office). In part, this resulted because of the noise in the open office. Users mentioned that it was at times difficult to make telephone calls.

Technology Issues

Three of the ten most important issues to fall under technology included: access to technology at the office; access to technology at home; and ability to handle mail/text at home.

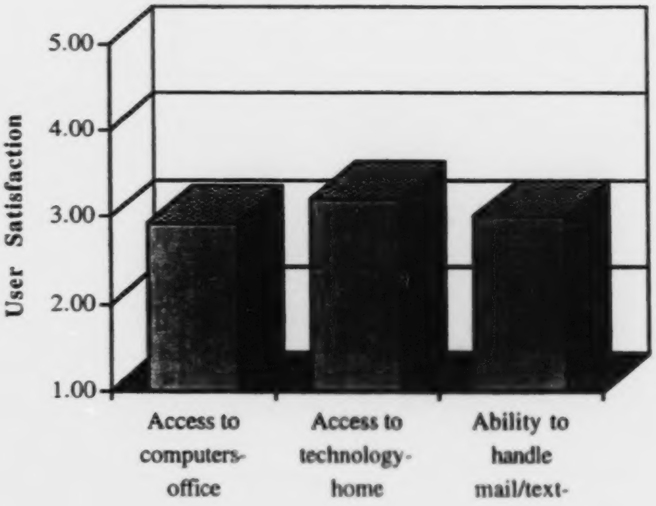
The technology issues were rated on average "about the same" compared to that of the previous system. All of the issues had a mean score of

Figure 85: Frequency Distribution for Ability to Make Telephone Calls in DECsite's Natural Office



approximately 3.0, with an index of 3.0 (see Figure 86: Technology Index). As mentioned earlier, approximately 50% of all users had access to technology at home. This technology, however, was not issued as part of the new environment. Likewise, the technology did not improve as result of the new office system.

Figure 86: Technology Index



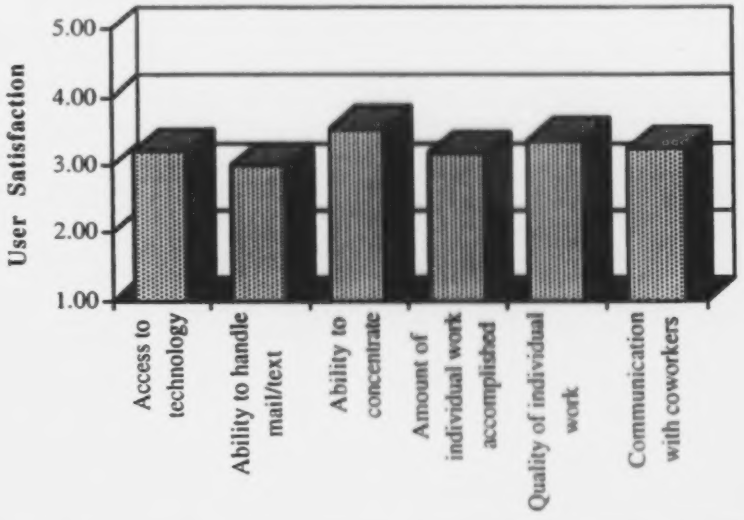
Home Issues

Three of the ten most important issues grouped in the "home" category were: access to technology from home; ability to handle mail/text at home; and quality of individual work performed at home. Amount of individual work, ability to concentrate at home, and ability to communicate with coworkers at home were also added to the index.

All of the issues included in the home index were rated higher than the previous office system. The average index was a 3.3, with a range of 3.0 to 3.5 (see Figure 87: Home Index). Ability to concentrate and quality of individual work were rated the highest for all home issues. Interestingly, these two issues were rated lower than many of the other work effectiveness issues, indicating that perhaps these job tasks (work requiring high concentration and other individual work) should and could be better performed at home rather than in the office.

Ability to handle mail/text at home was rated about the same in the new environment as in the old. Again, technology for working outside of the office was not changed as a result of moving to The Natural Office, therefore it was expected that this score should indicate little to no change.

Figure 87: Home Index

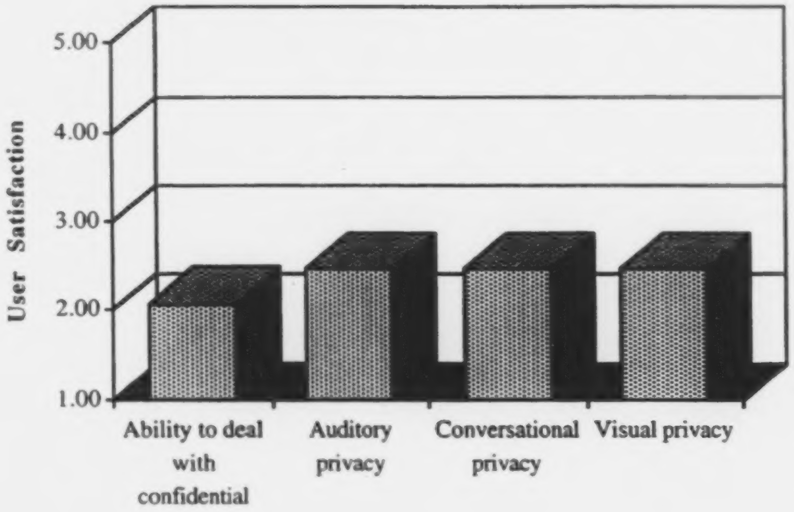


Privacy Issues

Privacy issues were not rated very high in importance. For the purpose of defining the effects of the new office on privacy, we looked at the following issues: auditory privacy in the office, ability to deal with confidential issues while in the office, and degree of conversational and visual privacy in the office.

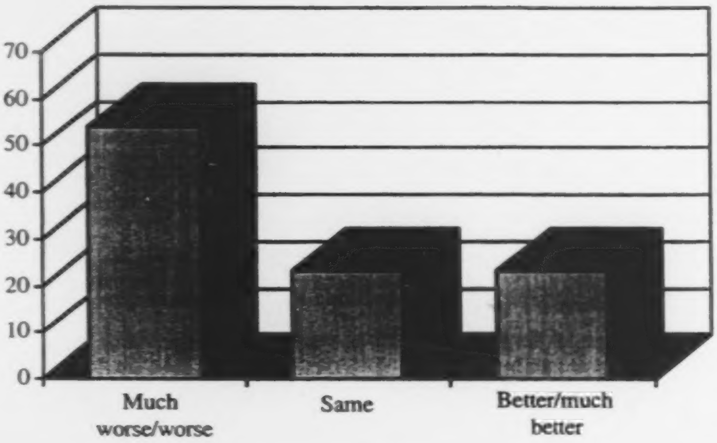
The privacy issues were rated fairly low compared to the previous office system, with an average index of 2.4 (see Figure 88: Privacy Index). Again, users moved from individual offices to a completely open environment which allowed for little privacy. The two private rooms and conference room eliminated some of the problems with privacy, but because these rooms tended to be occupied by visitors or were shared with the entire floor, users often had to look elsewhere.

Figure 88: Privacy Index



While on the telephone, users walked or sat anywhere they wanted. Personal observations indicated that users frequently paced the office while on the telephone; thus, it was very difficult to "listen in" on a conversation carried out in this manner. Where users had a difficult time was the ability to handle confidential matters in the office with another coworker.

Figure 89: Frequency Distribution for Conversational Privacy in DECsite's Natural Office



Almost 55% of all survey respondents rated their satisfaction with conversational privacy as worse in the Natural Office compared to the previous office environment (see Figure 89: Frequency Distribution for Conversational Privacy in DECsite's Natural Office).

Storage/Personalization Issues

None of the storage/personalization issues on the survey were rated high in importance to Natural Office users. To help describe the effect on these issues as a result of The Natural Office, we examined the following issues: amount of personal storage; amount of work storage; ability to display personal items; ability to display work-related items; and access to files and reference materials.

The average index for storage and personalization issues was one of the lowest of all the averages for other issues, with 2.5. These issues, however, were rated among the lowest in terms of user importance as well. Users moved from offices that gave them the freedom to display personal items and had a fairly large amount of storage. The new office allowed for neither of these behaviors.

What was unique at The Natural Office compared to the other organizations and sites that we studied was the fact that users went through a training program geared specifically to changing behaviors before mov-

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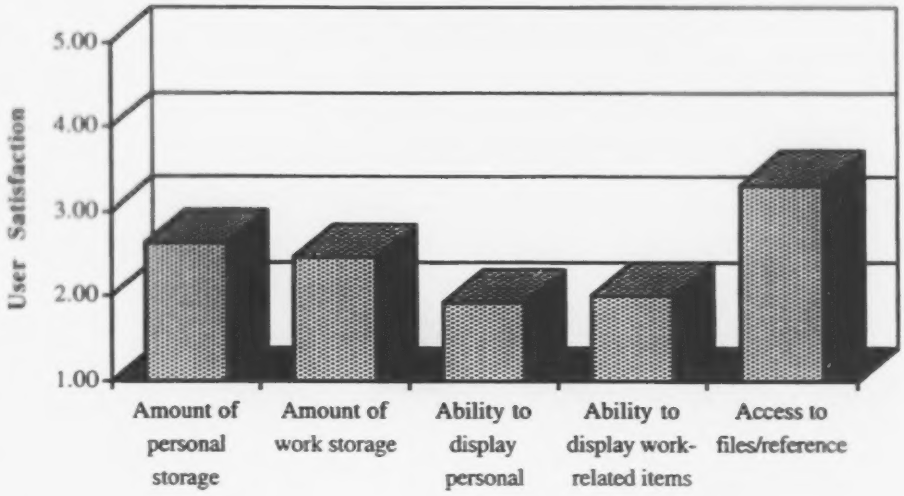
ing into the new office. The PEP program helped users to eliminate (hopefully, permanently) their need for large amounts of storage. It also helped users to think of "permanent" work stations (e.g., offices) as confining rather than productive. By changing these behaviors, users smoothly made the transition to the new office. Had these behaviors not been modified, we expected to see higher importance placed on these issues, particularly with regards to the amount of storage provided in the new office.

Figure 90: Storage/Personalization Index



Alternative Space/Design Issues

The issues that were grouped under this category included: informal meeting areas; informal break areas; dedicated project or team rooms; resource centers; and number and location of conference rooms. In addition, access to files and references was included in the average index.

The design of the new office was rated fairly high by users, with an average index of 3.3 (see Figure 91: Alternative Space/Design Index). The office offered users a variety of different workspaces, including their primary workstations, informal meeting areas, and private rooms. The lowest rated issue among the design factors was the number of conference rooms, which was expected given that the office only provides one conference room. As mentioned above, this conference room was often used by guests, therefore users may have had a difficult time using the conference facilities when necessary.

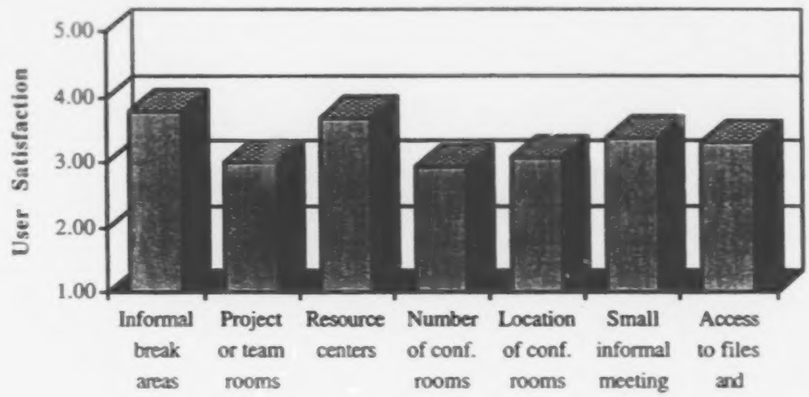


Figure 91: Alternative Space/Design Index

Overall User Satisfaction with The Natural Office and The Implementation Process

The major focus of the DECsite project was on ergonomics and team collaboration. Because this project was the first of its kind in Digital Sweden, it was not possible to discuss changes in the implementation process.[14] The following, however, is a brief review of the implementation process for this particular site.

- The entire group participated in the PEP program, which encouraged employees to question traditional work patterns and behavior.
- Instead of trying to work as a single large group on the project, a small, four-person planning committee was formed to plan and design the project. Outside consultants were also solicited to help with things like HVAC, furniture design, and sketches of the proposed office design.
- The office officially opened four months after the group occupied the space to allow employees time to develop rules and regulations for using the office, as well as work out "teething pains."
- Mobile workstations were provided to allow users the freedom to work anywhere in the office.

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[14] Note: The Office of the Future in Digital, Finland occurred before this office arrangement was implemented. The office, however, no longer exists. While the Office of the Future was researched in the Managing Space Efficiently study, the data was not such that we could compare the different components of the two independent initiatives in detail.

- A variety of alternative spaces were added to the design (conference room, informal seating areas, eating areas, etc.).

- The office provided limited but adequate storage areas.

- Special features were included in the design to maximize economy, efficiency, energy, and ergonomics in the office, such as automatically adjusting lights and ergonomic furniture.

- All computers and workstations were essentially height-adjustable.

- Users were given cordless telephones, allowing them to handle calls anywhere in the building.

- Electronic mail could be used for communication and to help facilitate telephone call handling.

The Natural Office Implementation Process

Applying the rating system described above (see *IWSP's Rating System for the Implementation Process* in the IBM, UK section), the planning, design, and technology aspects of The Natural Office were scored and plotted. Strong emphasis was placed on all aspects of the project, particularly on design considerations (see Figures 92, 93, and 94 on the following pages).

Overlaying these components with user satisfaction revealed that user satisfaction was quite high. While there were no sites internal to DECsite to compare to this particular workplace project, the following section discusses some of the aspects of the project that made it unique compared to some of the other workplace projects we studied.

- Although several other sites within Digital Equipment Corporation have attempted office innovations similar to The Natural Office (e.g., The Office of the Future in Finland, The Flexible Office in the UK, etc.), this project was an independent initiative. Group members heard information about the office in Finland,[15] but they determined to create their own work environment without the aid of this office.

- The project was solution-oriented, meaning that the manager knew how he wanted the office to look and encouraged users to focus on these specific concepts. Evidence that this project was solution-oriented (rather than process-oriented) was that the smaller planning group had to be formed because there were too many "traditional"

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[15] Becker, F., Sims, W., and B. Davis, 1991.

Figure 92: The Planning Process for DECsite's Natural Office

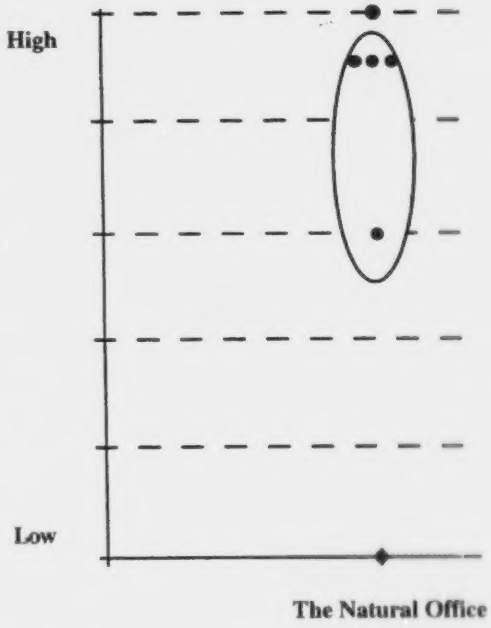


Figure 93: The Technology for DECsite's Natural Office

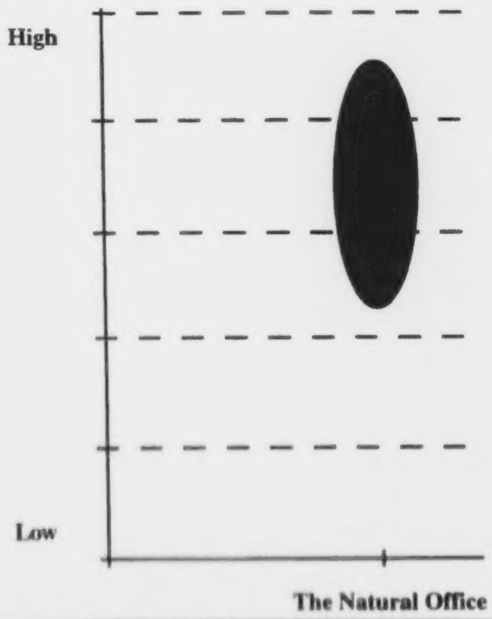


Figure 94: The Design for DECsite's Natural Office

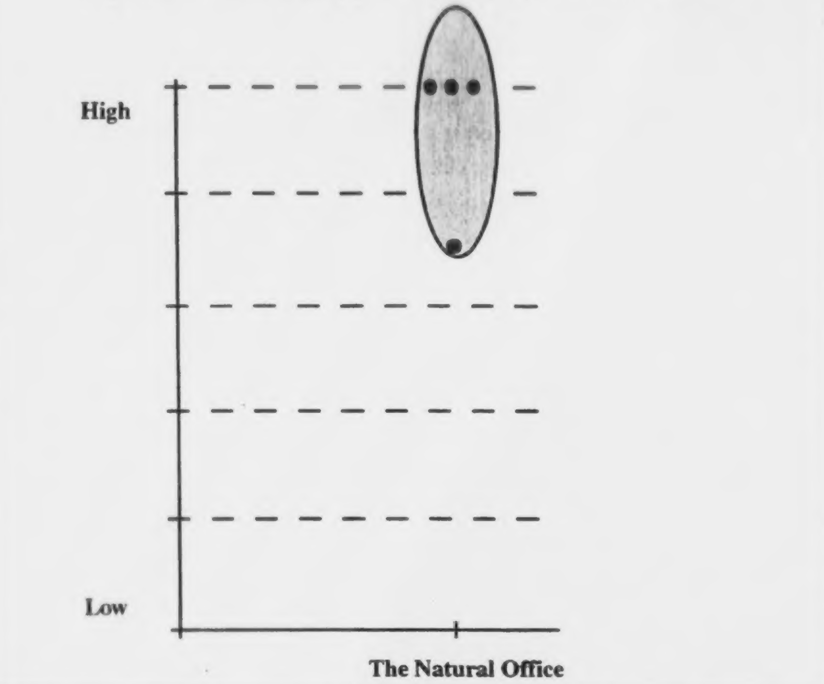
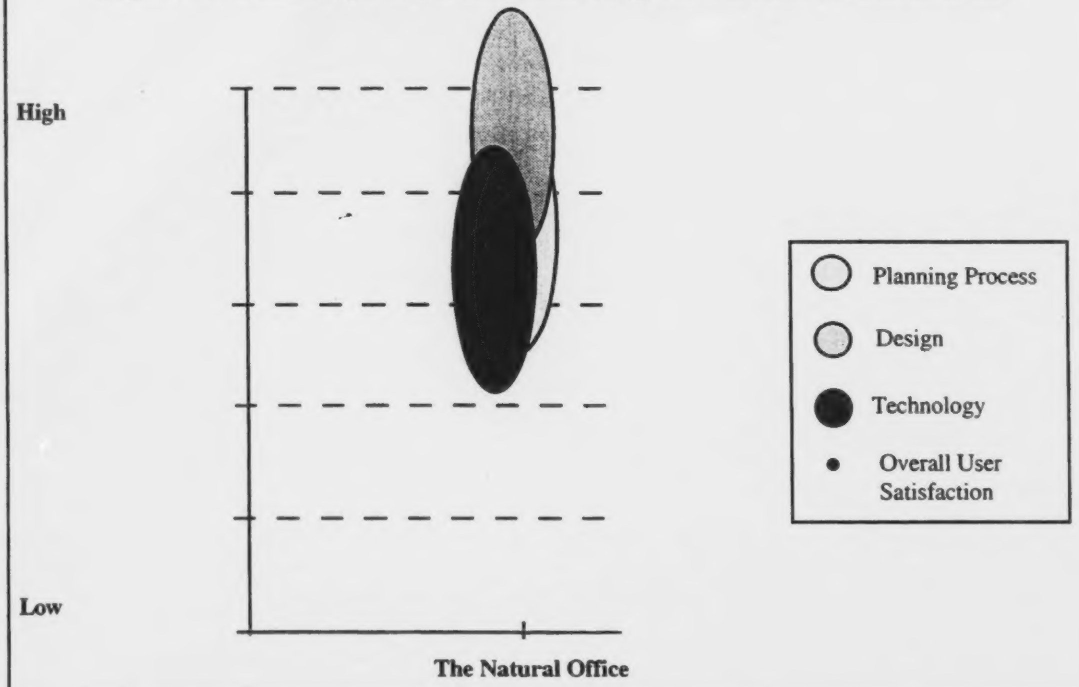


Figure 95: Planning, Design, and Technology for DECsite's Natural Office



ideas being generated at the original brainstorming meeting. These planning committee members were chosen and influenced by the manager.

At the time this report was written, the office concept was also being introduced to other areas within the same building. These new areas had many of the same components as the original office: mobile pedestals, height adjustable computers, and a central decor theme. In process-oriented projects, the *process* becomes standardized; how to encourage people to rethink their environment, how to help users to come up with the best working environment for their needs, etc. In this case, the actual solution became the focal point of the project, with any changes in the design and technology representing refinements of the original workplace strategy created for DECsite.

- The project was a unique form of non-territorial office; users actually owned their workstation. In most non-territorial offices, users do not "own" any aspect of the office. What defines The Natural Office as non-territorial is that the space—the location—that the users occupied was temporary.

- The DECsite project was one of the first (and only) projects that we have come across that actually took steps to formally change employees' work behaviors. The PEP course not only helped people to reduce their storage requirements, but it also helped them to free themselves from a permanent work location. After the users moved into the new office, consultants who were running this PEP program periodically walked through the office and had people go through all of their papers to make sure they were still working towards becoming—if not paperless—free of unnecessary paper.

  Project managers also initially helped to change individual work behaviors by "keeping watch" over the office to find out which people tended to work in the same locations day after day. To encourage these people to remain flexible in their work patterns, project managers arrived at the office early and took these locations for themselves, forcing people to change their work habits.

- The Natural Office was business-driven; one of the major goals of the new office was to facilitate communication and team work. The cost to design the office was quite expensive compared to what a traditional office would have cost, but the manager felt that the increases in productivity would quickly make up for the added cost of the office. In fact, figures estimate that productivity rose 20% after moving to the new office.

- There was a strong emphasis when designing the office on flexibility. Users could basically work anywhere in the office from any position. The technology and design of the office both worked to support this way of thinking and working.

  One area that the project did not emphasize as much was freedom *from* the office. Although the official premise behind the office was that employees should have choices about their working environment—do they want to come into the office, who do they want to work with, what equipment do they want to work with, and what position do they want to work in (standing up, sitting down, etc.)—the technology provided to the users did not support working away from the office. It was estimated that about 50% of users had computers in their homes, but this equipment was not issued as part of the office concept.

- The Natural Office took special steps to assure a healthy work environment (e.g., ionizers, special air filtering system, natural lighting, ergonomic furniture, etc.).

- A strong champion(s) in the office helped to keep the office running in the same flexible manner for which the office was originally designed. Use policies were followed and enforced diligently to make sure users did not revert to old office behaviors.

Lessons Learned

Lessons learned from studying the non-territorial office at DECsite included:

- Steps taken prior to and subsequent to the move to the new environment to change people's work behaviors and perceptions, helped in the transition to a new way of working.

- As was the case with many of the other sites we examined, users needed to be supported (by technology, management policies, environment, etc.) in a variety of work locations. Managers need to start viewing the workplace as an integrated workplace strategy, where users can move seamlessly through a variety of settings. Up to this point, few organizations have taken this approach.

- The strong champions/supporters of the office concept had a substantial impact on the office and the users. Skeptics were slowly converted by being shown and taught about the advantages of the office. Changes in work behavior were encouraged (and enforced) by managers, who vigorously modeled the behaviors they wanted to see in their staff.

Conclusion

We discuss below each of the specific research questions identified at the onset of the ***Innovative Workplaces*** study with reference to Digital Equipment Corporation and the Natural Office. Later these questions will be discussed in more detail, with reference to all the organizations studied.

- *What factors (e.g., planning and design process, nature of technology, the design of the setting) tend to change the most as projects evolve?*

As we were only able to study one implementation of The Natural Office concept due to time constraints on the project, we were unable to answer this question specific to Digital.

- *What aspects of the new workplace system tend to become standardized or uniform?*

To a certain extent, this question can be answered for DECsite using information gathered in interviews and site observations. The spread of the office into other areas of the building indicated the design aspects were becoming more standardized as the concept evolved. For example, the new offices had mobile pedestals, height-adjustable computers, and a central decor theme running throughout the office. The *specifics* of the design were refined, however. For example, the retractable ceiling mount was replaced with a column on which a computer and workstation could be raised and lowered to create more work surface than before.

- *As organizations expand their implementation of new workplace strategies (within or across sites) does employee response tend to improve, remain the same, decline, or is there no consistent pattern at all?*

Again, this question can be addressed to some degree based on preliminary interviews and observations. Project managers on the second installation of The Natural Office concept mentioned that they had a more difficult time getting people to work the way they were intended to work in the new environment. Users seemed a bit removed from why they were being asked to work in such a fashion and how they were supposed to interact with the environment. Later interviews showed that time was taking care of many of these problems, but it took a longer time period and more effort on the part of the project managers to get people working in the environment.

- *What differences are there in terms of cost and employee response (satisfaction, work effectiveness) as a function of whether the workplace system is primarily cost-driven versus business-driven ?*

With a business focus, aspects were added to the environment that may not have been included had the office been primarily cost-driven. For example, multiple areas were added to the office that were quite expensive (e.g., a raised secretarial platform, conference room, cordless telephones, a lighthouse to indicate when calls were coming into the main line, etc.), but were justified because of the increases they provided in work efficiency.

- *What are the organizational implications of solution-oriented vs. process-oriented workplace systems?*

Until further studies can be done on the spread of this concept throughout Digital, we are unable to answer this question specific to Digital.

- *How does the implementation process change as the project moves from the pilot stage to widespread implementation? Is it necessary to focus as much attention on all three factors (design, technology, and planning process) in second and third installations to ensure similar success patterns as those achieved in the pilot project?*

Until further studies can be done on the spread of this concept throughout Digital, we are unable to answer this question specific to Digital.

- *What is the nature of organizational learning that occurs as a function of whether the workplace system is process- vs. solution-driven, cost- vs. business-driven, or part of a strategic initiative versus an independent initiative?*

Until further studies can be done on the spread of this concept throughout Digital, we are unable to answer this question specific to Digital.

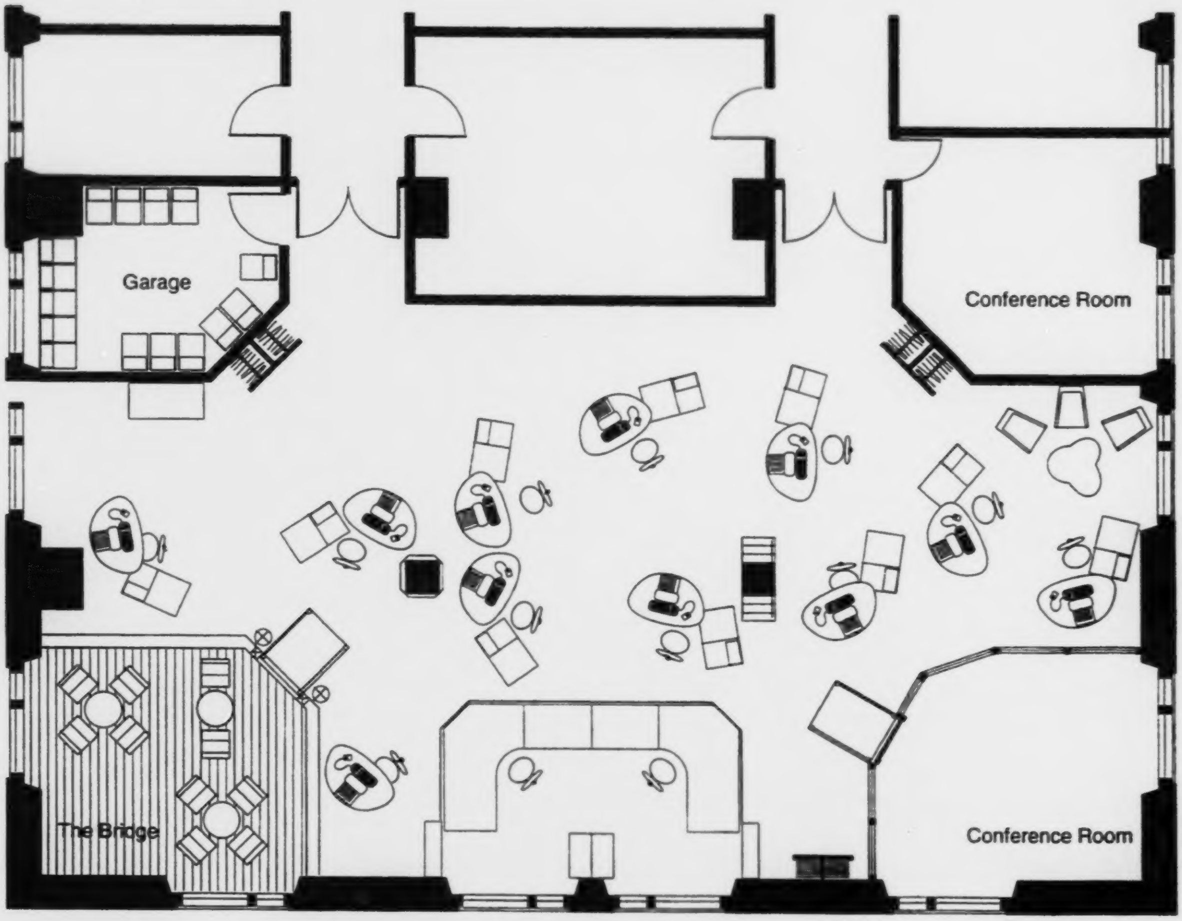

Garage
Conference Room
The Bridge
Conference Room

Figure 96: Floorplan of DECsite

SOL Cleaning Company Helsinki, Finland

Workplace Strategy Overview

SOL Cleaning Company began operations two years ago in 1992 in the industrial section of Helsinki, Finland. At the end of 1991, the Lindström family company—one of the oldest family-owned firms in Finland—divided, giving Liisa Joronen control of the cleaning services division. Before that time, Joronen acted as the General Manager of Lindström.

Previous to the division of the company, Lindström had implemented

Photo 27: SOL Overall

many flexible practices, such as non-territorial offices in 1989, and a flexible management philosophy (see below) in the mid 1980s. According to Joronen, although Lindström was innovative compared to other firms in Finland, it still operated in a fairly traditional manner. When Joronen took the cleaning services aspect of the Lindström company to form SOL, her intent was to develop a firm based on completely new ideas, breaking down many of the traditional business norms in practice throughout Finland.

Goals/Drivers of the SOL Headquarters

- *To create an innovative environment that would support the SOL Cleaning Company's management philosophy of employee empowerment.*

Principles of the SOL Headquarters

- *Give employees three freedoms:*
  - *Freedom from the workplace*
  - *Freedom from working hours*
  - *Freedom from status symbols.*

SOL now has 2,400 employees, 150 of which work flexibly. These 150 employees include the managers, administrators, and supervisors of the company. Cleaners comprise the remainder of the 2,400, who, at the time of this report, were not working flexibly.

SOL has sixteen "studios"—the term SOL employees use to refer to their offices— which, though working in a similar fashion, tend to be smaller than the Helsinki headquarters.

SOL was one of the first examples we found of an *integrated* strategic initiative of flexible working, where management practices and policies and technology supported seamless work settings (e.g., the office, home, client sites, etc.). All of the SOL studios operated in the same flexible manner, with the concept originating at the corporate level in Helsinki. SOL functioned around the concept that people could work any time and in any place, as long as employees completed their work tasks.

Like DEC Sweden, it was also one of the few examples we studied of a business-driven non-territorial office (rather than a cost-driven office), and the only example of a process-focused implementation. These concepts are discussed in more detail in Par*t I* of this report.

The Management Philosophy

SOL's employee empowerment management philosophy had direct bearing on the form of SOL's office space. In order to understand how and why the non-territorial office developed, it is necessary to first understand the management philosophy. Some of this philosophy was developed and implemented at Lindström before SOL was founded. SOL, however, refined the philosophy to include customer satisfaction measures, performance measures, and many other aspects.

The philosophy centered around the concept that companies must give their employees the opportunity to perform at their best. This means that, to obtain the best results, employees must be allowed to work however, whenever, and wherever they need.

Three "Freedoms"

The organization gave flexible employees three work "freedoms:" freedom from the workplace, freedom from working hours, and freedom from status symbols. Freedom from the workplace implied that employees were not confined to a single location; it did not matter where employees worked, be it in the office, at home, or at other SOL studios, so long as the location best suited the employees' working tasks. The only factor dictating how or when employees worked were the customers. Customers included both external customers and internal customers; clients requiring cleaning services, and coworkers, respectively.

Freedom from working hours removed time as a measure of productivity. Flexible employees were not valued by the amount of time they were in the office, but by the results of their work. In order to accurately measure employee results, the management system depended heavily on individual goals, or "targets," set by the employees. Employees set their own monthly target at the beginning of the year and then met with their "supervisors" or "managers" several times throughout the year to discuss their progress. The target was actually an index comprised of four or five factors such as customer satisfaction with the employee's work, profitability, amount of customer turnover, and amount of training conducted by the individual employees. The employees received monthly feedback on where they were in relation to their target (see Performance Measures for more details).

Freedom from status symbols centered around the philosophy that no one person's work was more important than anyone else's, and that the organization had to operate as a team in order to perform well. The company could not operate without the cleaners, the supervisors, the administration, or the managers. All status symbols were removed— no one had an office, a secretary, or anything that could be viewed as "special treatment."

Meeting the Goals of the Company

To determine if the management philosophy was in reality successful for the company, SOL established certain company success factors. These success factors included: customer satisfaction; employee commitment and motivation; and profitability. Performance measures were then developed to calculate how each employee—and the company as a whole—performed in accordance with the three success factors.

Performance Measures

As dictated by their management philosophy of employee empowerment, employees set their own performance goals. Performance was measured in terms of how well employees hit these individual work targets. For sales people, the target was based on the number of sales or new clients the person made that month. For supervisors, it was \based on the number of people trained, number of offices cleaned, etc.

The targets were actually comprised of several different factors, including customer satisfaction, training, profitability, retaining customers, etc. This multifaceted index insured that employees were meeting all of the goals, not just one component, such as customer satisfaction at the expense of profitability.

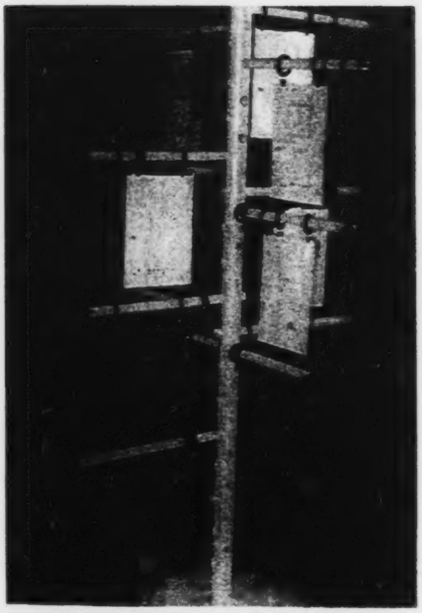


Photo 28: Performance "Tree" to Display Charts

A portion of the employees' salaries were also based on their ability to hit the established targets. Employees had both a fixed and variable salary, of which the variable component (anywhere from 10%-50%) was based on reaching their targets. If they did not reach the targets, they did not get the variable component of their salary.

An additional component factored into the index was the performance of supervisors/administrators/managers employees; supervisors' performance ratings were based on their peoples' abilities to reach their targets. Managers' performance measures were based on their supervisors' abilities to meet targets. Therefore, supervisor/administrator/manager salaries were dependent on the performance of their workers, thus encouraging a team effort in ensuring the business objectives were met.

Targets were set one year in advance for each employee. The employees (except for the cleaners) set their own targets, but they discussed these targets with their supervisors or managers to ensure they were reasonable. Employees and supervisors scheduled two follow-up meetings during the year to see how well the targets worked: were the targets reasonable? If they were not met, why not?

Each employee's performance was public knowledge. Charts were constructed showing each employee's performance over a period of time. Anyone wishing to see someone's performance chart was able to do so. These charts were not meant to embarrass the employees, but were to help the employees strive for certain goals. The open access to performance charts also helped eliminate hierarchical barriers; because an upper-level employee did not report to anyone did not mean they were not accountable to the company for their work.

Summary of the SOL Cleaning Company Installation

As was the case with The Natural Office at Digital Equipment Corporation, only one site was studied at the SOL Cleaning Company. Because there is only one site, the case study of SOL headquarters has been incorporated in the summary of the installation. This write-up differs from those of the multiple site organizations, where the summary section compares the different sites in more general terms, while more detailed descriptions were included in the Appendix.

Drivers of the Non-Territorial Office

SOL's non-territorial office was a physical manifestation of their management philosophy. In essence, this philosophy was the driver of the non-territorial office. Employees wanted an office that would remove all barriers to managers and supervisors, both physical (walls, offices) and mental (status). An open office plan allowed employees to communicate openly and collaboratively without the constraints of a traditional office.

Implementation Process

As mentioned earlier, the Lindström Company divided their business in December of 1991. Employees were recruited for the cleaning company between Christmas and New Year's, 1991/92. The search for a facility to house the young company began immediately upon the start of the new year. A small team of five or six people (upper administration) looked at facilities in Helsinki and narrowed the choice of spaces down to about three or four. Employees then had three to four opportunities to visit the different spaces and help choose the location. The location that they chose had previously been a photographic studio, thus the name "studios" for offices.

Two design meetings were held where everyone moving to the SOL studio was invited to participate in a brainstorming session on how they wanted the office to look and function. People not able to attend the meeting could fill out "absentee" forms with their suggestions. The management practices/philosophy had already been developed at Lindström, so these meetings were simply to design the space.

An architect was then hired to draw up preliminary plans for the office using the ideas generated by the employees. The employees reviewed the plans in four groups of about ten people. Employees gave the architect direct feedback on the plans for the office. The architect then reworked the drawings to incorporate employee suggestions. Work on the office began shortly after the architect submitted the second set of drawings.

The actual space/layout was fit out in five weeks. An office administrator coordinated all the work on the office. The architect refused to purchase the furniture the employees wanted because he did not believe what they had picked out was going to work. The office administrator then arranged for four or five employees to purchase the furniture (or to arrange for the furniture to be purchased). About 20 employees were actively involved in purchasing the furniture and other pieces.

The Planning Process

The six major areas identified as important in the process of planning new office environments included: project ownership by the business/department/group; data collection on work time-activity patterns; collaborative, cross-departmental involvement; end user involvement; informing users; and training . Figure 97 summarizes our findings for the SOL headquarters office.

Project Ownership

The project was owned completely by the company. The only outside consultation took place with the architect who drew up the plans, but this

Figure 97: SOL Cleaning Company Planning Process

		SOL
Project Ownership:	Departments/Groups/Businesses	●
Groups/Teams/Committees:	Steering/Planning Committee	●
	User Representatives (non-managers)	●
	Managers	●
	Other	○
Collaborative Team Project:	Departments/Groups/Businesses	●
	Facilities/Premises Management	●
	Space Planning Consultants/architect	●
	Management Information Systems	●
	Human Resources	●
Data Collection:	Occupancy Patterns for Group/Site	○
	Needs Analysis for Group/Site: Space	○
	Technology	○
Method of Informing or Involving End-Users (non-managers):	Workshops	●
	Seminars	○
	User meetings	●
	Bulletins/Newsletters	●
Training:	Office Use/Behavior/Technology	○

○ Did not have
● Did have
▨ Occurred post-implementation

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person was subject to the ideas and decisions made by the employees. This "lack of control" on the part of the architect was evident in the fact that the architect had to rework the plans for the office after employees had seen his initial recommendations and had been somewhat displeased with many of his suggestions.

Project Teams/Committees Established

Several different teams were formed to help implement the office. The first group was the five to six management level employees who sought a location for the company. The other team consisted of four to five core employees in charge of purchasing furnishings.

Collaborative Team Effort

The SOL project was collaborative in the sense that it involved employees from a variety of fields, but, as a small organization, they lacked the vast in-house knowledge base present in many larger organizations. Certain people within the organization who had special interests or skills were put in charge of different operations (e.g., MIS, HR, etc.), although these areas were not necessarily what they were hired within the organization to perform. For example, the MIS person was actually a sales person that was also in charge of MIS.

End User Involvement

End users, even those who were not specifically assigned to one of the committees, had a variety of opportunities to participate in the planning and design process. Users helped pick out the location if they desired; they participated in design brainstorming sessions or submitted absentee forms with their suggestions; they reviewed and influenced the drawings by the architect; and/or they helped pick out and purchase the furnishings.

Employees were not required to participate in these activities, but all planning sessions were open for employees who had an interest in being involved.

Data Collection

No data was collected on the SOL group before implementing the office environment, although the manager and other associates did extensive research on management techniques and policies.

Training

Beyond the normal training in how to perform their jobs, users received no formal training on how to work in the environment.

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Summary of the SOL Headquarters Planning Process

To briefly summarize the nature of the planning process for SOL headquarters:

- The search for the appropriate location for the facility began in January of 1992.
- Once the facility was determined, two design brainstorm meetings were held to get employees' ideas on how they thought the office should look. Users who could not attend these meetings were invited to submit absentee forms with their suggestions.
- The architect was hired and began working on the design of the office according to the ideas generated in the brainstorming sessions.
- The architect met with interested employees to discuss his original recommendations for the new office environment.
- The architect then reworked the drawings to more accurately conform to employees' suggestions.
- Purchasing and construction began immediately after the final plans were submitted. Purchasing and construction was headed by the office administrator, who then formed a committee of four to five people to help supervise.

Design

Office Area

The office area had "The City" as a central theme running throughout, with a street (and street lights), building facades (residential and city scape), blue night sky with stars, and a marketplace.

The first area people unknowingly encountered upon entering the office was the warehouse. The warehouse was situated alongside the administrative part of the office. A plywood residential facade separated the two operations. The purpose behind this arrangement was to try to prevent a separation of business functions; office/administrative work should not be seen as more important than the day-to-day administrative operations (or vice versa) because both were needed for the company to accomplish its objectives.

A large silo was located in the center of the first floor. This silo was used

Photo 29: SOL Interior Revealing Building Facades

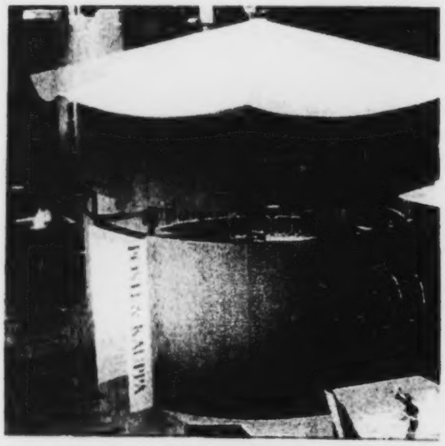


Photo 30: SOL's Storage Silo

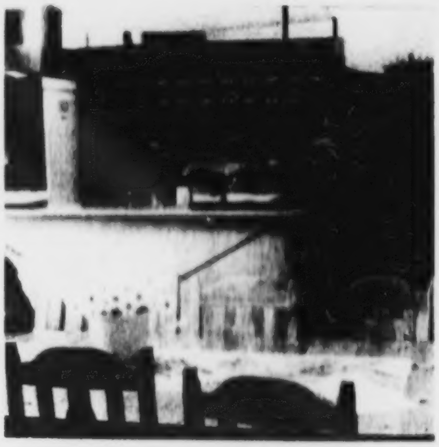


Photo 31: Kitchen Table

Photo 32: SOL Small Isolated Meeting Area

Photo 33: SOL Dining Room Table as a Conference Area

Photo 34: SOL Meeting Area

as a mail and supply room. One side of the silo contained employee post boxes, while the other side held the majority of the office supplies.

The administrative office area consisted of two floors: the first floor, where the majority of work occurred, and a second floor balcony offering a variety of alternative work areas. Although the walls and ceiling were painted black during the days when the office was a studio, most of the interior was decorated with bright colors. Music, the sound of a water fountain (which displayed the Finnish Malcolm Ballridge Award for innovation, won twice by SOL), and noises from the random animals (birds and gerbils) could be heard in the background.

A variety of spaces were provided for the employees to work in an informal, relaxed atmosphere. Some of the areas were designed into the system not only for the employees to use, but also for their families, should the employee need or want to bring them into the office. The first floor was equipped with a young children's room to accommodate small children during the hours outside childcare was not available. For the older child (or spouse), an informal area was provided equipped with a television, a stereo, a pool table, and a video game system. An informal kitchen area, complete with refrigerator, oven, and kitchen table, allowed employees to fix hot meals in the office and discuss business matters informally, much as a family discusses the plans for the day at the breakfast table. Additional areas, besides the more traditional workstation areas (see "Workstations" below) on the first floor included a library/reading area and exercise room.

The second floor balcony offered primarily nontraditional furniture arrangements. Some of the areas located on this floor included: a training area with overhead projector, seating, and other equipment; several couches and coffee tables; a large dining room table where employees often discussed business with clients or conducted team projects; a smoking area; and several small workstations with wicker tables, chairs, and terminals. Two traditional small desks with computers were also located on the balcony.

Workstations

Except for a few jobs that had special considerations, such as intensive paperwork and/or special equipment needs, all employees worked in a non-territorial fashion. Lindström had implemented non-territorial offices about two years before SOL was created, therefore any employees who came to SOL from Lindström were already familiar with this type of office arrangement. The layout offered a variety of work locations, from the traditional workstations, to the more informal work areas mentioned above.

Photo 35: SOL Separate Meeting Area

Photo 36: SOL Workstations and Storage

Traditional workstations were located in five clusters throughout the first floor. The workstations varied in height (from standing workstations to sitting) and size. Although the furniture was all from the same line, there was little uniformity in the selection. Only one or two of the workstations were assigned, while the remainder were non-territorial. If these assigned workstations were vacant, however, any employee could use them.

A clean-desk policy was in effect for all workstations. People were required to clear the workstations if they left the office for any amount of time.

Again, people had the freedom to choose wherever they wanted to work in the office; either upstairs, downstairs, formal areas, or informal. People tended to use the upstairs for team projects/work, for concentrative tasks, or telephone calls requiring a bit more privacy.

Storage

Across from the warehouse, a city scape covered a wall of mostly "historical" storage approximately 20-25' high and 30' long. This storage area consisted of open shelving and contained a built-in ladder to facilitate access to the files. This wall storage provided the primary nonelectronic storage for the office. The majority of storage was done electronically, with the exception of salaries and bookkeeping, for which law required keeping hard copies.

Each employee had use of a small black cabinet with two shelves. Rows of these cabinets were located against the exterior wall. Additional storage was available in the form of a large tote bag for holding files and personal materials. These tote bags allowed employees to carry their work with them to any location. When not being used, the storage bags were placed in two-tiered shelves. Employees also had individual post boxes assigned to them located in the silo.

Space Cost

The office area was approximately 6,500 sq. ft. Although exact figures were not available, it was estimated that the office cost 1.0 million FIM ($186,100 U.S.) for furniture, construction, and fit out; everything except for technology. Including technology, the building was insured for 1.9 million FIM ($353,700 U.S.).

The office cost approximately 30% of what it would have cost to implement a traditional office. One reason for this is because it cost them very little to build. Employees volunteered their time to help design the office in the five week time constraint. Also, the informal furniture was residential quality rather than commercial , which is less expensive. Some of the art and animals were donated to the company as well.

Overall Design

The major goal of the design of a work environment should be to support the ways in which people work. For non-territorial offices, some of the major attributes that help users work more effectively include:

- Multiple forms of work areas to support different tasks, such as concentrative work, team projects, small meetings, etc.
- Adequate storage for both personal and work related materials.
- Flexibility to handle peak periods and growth in the department (both temporary and permanent).
- Common areas for meetings (formal and informal) and break-out areas for relaxation.
- Surroundings that encourage communication, collaboration, and exchange of ideas without negatively impacting the productivity of the group.

Figure 98: SOL Cleaning Company Design describes some of the physical attributes of the SOL headquarters office.

Multiple Workstations

Employees could choose whether they wanted to work in formal or informal workstations. The formal (primary) workstations were located on the first floor of the building, while informal workstations (couches, dining room tables, coffee tables, etc.) areas were located throughout the facility.

Storage Alternatives

As mentioned above, employees had two to three personal storage alternatives in addition to the common storage located along the back walls: tote bags, a single black storage cabinet, and their individual post boxes (which could be used for messages, paper storage, mail, etc.).

Photo 37: SOL Tote Bag Storage Area

Common Areas

Common areas for informal meetings, individual working, relaxation, etc. were located throughout the facility on both floors (see above for more details)

Design Considerations

Certain design considerations not found at any of the other sites examined were relaxation or "family" areas. Employees were provided with workout rooms, children's rooms, play areas, etc. that could be used by the employees or that their families. These design considerations were included to balance the involvement that family members have on the workplace, as well as the influence that the workplace has over the family.

Summary of Design

To summarize the design of the SOL office:

- A variety of traditional workstations for employees who were not comfortable working in the informal areas.
- A variety of informal workspaces (kitchen areas, "living rooms," "dining rooms," etc.).
- A variety of small storage areas.
- Special features to provide a relaxing atmosphere for the employees, as well as special "family" areas.

Figure 98: SOL Cleaning Company Design

		SOL
Multiple Workstations:	Primary (traditional) workstations	●
	Adjustable height workstations	●
	Work rooms/Quiet rooms	○
	Informal (non-traditional) workstations	●
	Dedicated visitor workstations (dept.)	○
	Dedicated visitor terminals (location)	○
Storage Alternatives:	Tote bags	●
	Personal shelf-storage	●
	Mid-level storage cabinets	○
	Overhead storage areas	○
	Floor-to-ceiling common storage areas	●
Common Areas:	Conference Rooms	●
	Break-Out Areas	●
	Informal meeting areas	●
Design Considerations:	"Family" areas	●
	Office design theme	●
	New furniture	●

○ Did not have
● Did have
▨ Occurred post-implementation

Technology

Three areas of technology found to be important to the implementation of non-territorial offices included: technology available in the office; technology to support work outside of the office; and technology to support communication. Figure 99: SOL Cleaning Company Technology depicts the technology SOL installed at the headquarters.

Office Technology

Twenty-three computers were located at workstations throughout the office, twelve of which were microcomputers. The remaining eleven were basic terminals linked to a mainframe. The building could actually be fit out with a maximum of thirty-two computers. In addition, the office was equipped with three extra places where laptops could be plugged into the system. Everything connected to the LAN, both office and home technology.

Workstations were supplied with printers, adding machines, typewriters, and work supplies. In all, there were:

- 6 printers;
- 3 typewriters;
- Approximately 15 adding machines.

Figure 99: SOL Cleaning Company Technology

		SOL
Office Technology:	Increased access to latest PC	●
	Docking stations to link portables	●
	Access to printer, fax, modem	●
	Electronic diary/mail	●
Non-Office Technology:	Latest PC terminal	●
	Latest portable computer w/ modem	●
	Home Printer	○
	Fax	○
Voice Communications/ Telephone System:	Direct dialing number	●
	Voice mail/messaging	●
Special Technology Available to Users †:	Car telephones	●
	Customer site terminals	○
	Other	○

○ Did not have
● Did have
▨ Occurred post-implementation

† Equipment not part of standard technology package. Available if user can justify the necessity.

Non-Office Technology

Anyone who worked flexibly (everyone except cleaners) and could justify the need for a computer at home was given one. If a computer could not be justified, there were portable computers available for them to take home as needed. At the time of this report, SOL had 62 home computers. Twenty-four of these home computers were laptops, three of which were unassigned and could be checked out for short-term use.

Photo 38: SOL Cordless Telephone Storage

Communications

Every employee in the office had a cordless telephone in the office. Those who could justify it were also given a cellular phone for use outside the office. The employees had a direct number. All their calls to the direct number were transferred to wherever they chose (cordless telephone, home, car, or to voice mail). SOL had a total of:

- 33 cordless telephones;
- 61 mobile (cellular) telephones;
- 18 pagers/messagers.

In addition to the direct dial numbers, there was a main number into the Helsinki office. SOL, however, did not have any secretaries to answer these calls (secretaries were considered status symbols and were therefore never hired). Five telephones were located at different workstations throughout the office, and people took turns answering the main telephones. Messages were written in a book and placed in each person's box if they were not available.

In the planning stages of the SOL company, employees decided that they did not like using electronic diaries (which they had available to them at Lindström). A lot of communication was done through e-mail at SOL, however. Employees had a system on the computer that they could look up someone's telephone number, fax, e-mail, etc., and then leave messages accordingly.

No one was in charge of keeping track of employees' schedules except the individual. If employees were going to be out of the office for a period of time, the procedure was to let someone know so that people could take your calls. If an employee wanted to go on vacation, a person had to be found to do his/her job in the absence. Using this type of system, SOL never got behind in its work: when people returned from vacation, work started from the day they returned, not the day that they left for vacation.

Special Technology

Certain employees, particularly those dealing directly with customers (e.g., sales, supervisors, etc.) were given car telephones so that calls could be handled at all times. Many of those not given car telephones were given pagers/messagers to notify them of calls.

Summary of Technology

To summarize the technology employed at the SOL headquarters:

- In the office, users had access to both PCs and laptops.
- Many users had PCs issued to them to work at home. Those that did not could use one of the pooled laptops.
- Communications were handled through voice mail, e-mail, cordless telephones, and direct dial numbers.
- Users acquired cordless telephones or messagers depending on their need requirements.

Employee Satisfaction and Work Effectiveness

To understand the changes in the work environment and the effect these changes had on user satisfaction and effectiveness, the IWSP research team conducted a standard workplace survey at the SOL Company headquarters, as well as focus groups and interviews with the users. This section presents some of the results of the interviews and surveys, and discusses user work effectiveness and satisfaction ratings in relation to the changes in the office system and implementation process.

Table 20: Data Collection Techniques

Data Collection Technique	Total Number of People	Total Number of Locations
Cornell Workspace Survey	43	1
Focus Groups	4	1
Interviews	10	1
Personal Observation	—	1

Figure 100: Survey Respondents by Job Type

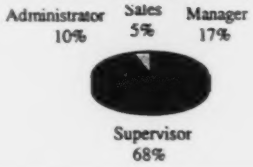


Figure 101: Survey Respondents by Age Group

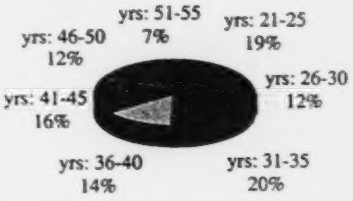
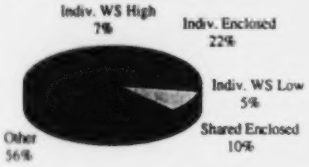


Figure 102: Survey Respondents Previous Workstation



Survey Background Data

User Profile

Job types of all the employees surveyed and interviewed fell into the following categories:

- managers;
- administrators;
- sales;
- supervisors.

The majority (69%) of the users surveyed were supervisors. Managers and administrative people constituted the next largest groups, with 17% and 10% of users falling in these two categories, respectively (see Figure 100). The only issue that differed significantly ($p < 0.05$) according to job type was user satisfaction with ability to communicate in the new office. Managers rated this issue higher than sales people ($t= 2.790$, $df= 7$, $p= 0.0269$), with means of 4.4 and 3.6, respectively.

The users were fairly evenly distributed across age groups, with the exception of employees over the age of 50 (see Figure 101). The only statistically significant difference by age group was with overall satisfaction in the new office. Users falling in the 21 to 25 age bracket rated their satisfaction higher than those in the 51 to 55 age bracket ($t= 2.275$, $df= 9$, $p= 0.0490$), with means of 4.9 and 3.7, respectively.

Seventy-three percent of all users surveyed worked in the SOL headquarters office for over 15 months. A fairly large contingency of workers (20%) had only been working in the office for 1 to 5 months. The majority of users had been working in an open environment, but a surprisingly large percentage (22%) had worked in individual enclosed offices before the SOL environment. Interesting to note is that users who had been in an enclosed office previous to SOL had a statistically significant higher mean overall satisfaction with the office than users who had been working in individual workstations with low paneling—4.9 versus 4.0, respectively ($t= 3.62$, $df= 9$, $p= 0.0056$).

For more information on the survey and the rating system of the responses, please see the *Methodology* section. A complete survey can be found in Appendix D.

Benefits of the SOL Office Environment

Users identified three principle benefits of working in the SOL office environment :

1) **Flexibility:** The majority of users commented that the main advantage was that they had the flexibility to work the way they wanted or needed. Employees could schedule their days around the customers, other employees, relatives, and friends without feeling like they were neglecting any aspect.

2) **Less wasted time:** Users did not waste as much time in the new environment. Because they had the freedom to schedule their own work, they spent less time sitting with nothing to do. In addition, they found that since they could schedule their own times, they spent less time talking to coworkers about non work-related matters and focused more on the job at hand so they could spend more time with their families.

3) **Work was more interesting:** The new environment and management policies added something to the everyday routine of work. Employees were more excited about coming into the office, and their work was more varied because they could do more than just what their job descriptions limited them to.

Disadvantages of the SOL Office Environment

Users identified three major disadvantages/areas of improvement :

1) **Long work days:** Many users commented that they felt that they were working all the time or were working extremely long days. Because there were not any "official" controls to tell them when to start and stop working, users were having a difficult time determining when to stop working on their own.

2) **Noise/distractions in the office:** Users commented that at times the office could be quite noisy. People sometimes yelled across the office to coworkers because it was very easy to do, which was distracting for other people.

Interesting to note is that these two disadvantages were the only points that users complained about; while normally we had to determine the three *biggest* disadvantages with the office environments, the points listed above were the *only* disadvantages that users told us about. In addition to the possibility that users were very satisfied with the environment and could find little wrong with the arrangement, in part this short list could be because of the language barrier; it is possible people had more complaints about the office, but could not translate them to English. Another possible reason for this occurrence could be that many users had been working in an open environment before coming to SOL, and had, therefore, already adapted to the changes occurred from moving from private offices to open offices.

Issues of Most Importance to SOL Headquarters Users

In addition to rating satisfaction, the survey also asked users to rate how important issues were to them. The ten issues that, on average, were most important to all users were:

- ability to receive mail while in the office;
- access to computers in the office;
- ability to receive messages when out of the office;
- ability to deal with confidential issues;
- ability to receive telephone calls in the office;
- ability to communicate with managers;
- sense of being valued by the organization;
- ease of concentration in the office;
- ability to communicate with coworkers;
- conversational privacy.

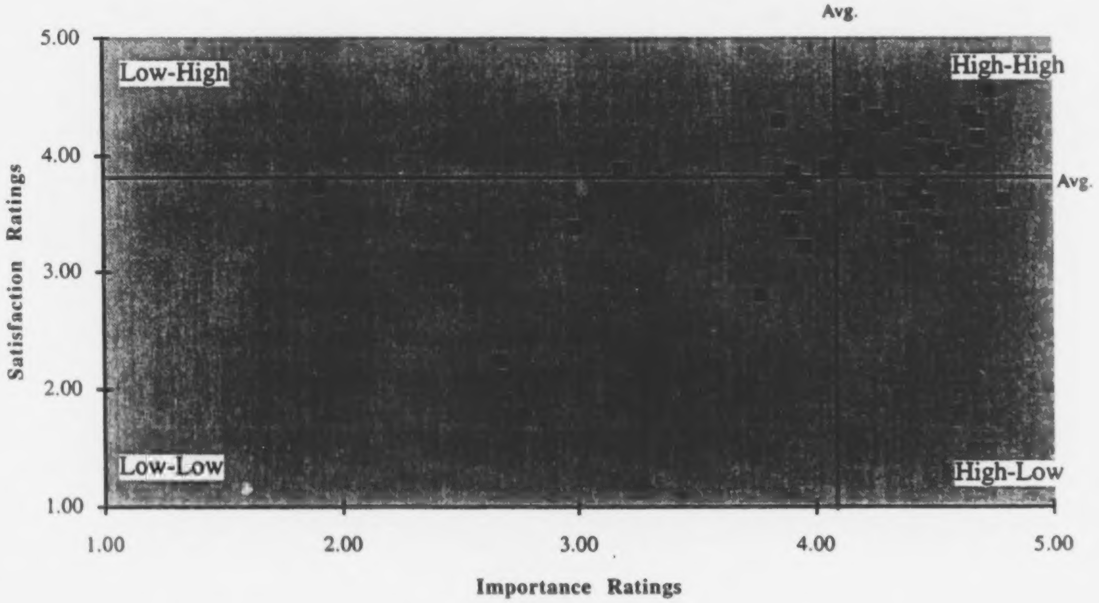
Issues of Least Importance to SOL Headquarters Users

The three least important issues among users were:

- the location of conference rooms;
- scheduling of conference rooms;
- the ability to display personal items.

Again, as with the other sites that we have surveyed, it is important to note that the degree of satisfaction did not influence the importance that users placed on the different issues. As the scattergram below depicts, users rated the importance of the location of conference rooms as very low (1.91—the least important of all the issues examined on the survey). The satisfaction rating for this issue, however, was quite high—3.71. In addition, the satisfaction rating for the ability to display personal items in the office was the lowest satisfaction rating for all issues—2.24. The importance level, however, was also low, with 2.67.

Figure 103: Satisfaction Ratings Compared to Importance



Issues of High Importance and High Satisfaction

Issues of high importance and high satisfaction included:

- ability to receive mail while in the office;
- access to computers in the office;
- ability to receive messages when out of the office;
- ability to receive telephone calls in the office;
- ability to communicate with managers;
- sense of being valued by the organization;
- ability to communicate with coworkers;
- quality of individual work performed in the office;
- access to coworkers in the office;
- access to informal break areas;
- auditory privacy in the office;
- communication with managers at home;
- amount of group work performed in the office;
- ability to display work-related items in the office;
- ability to conduct small informal meetings in the office;
- stress level at work;
- amount of work performed at home;
- ability to concentrate at home.

As was the case with the DECsite Natural Office users, users at the SOL headquarters ranked a fairly substantial number of issues as both high in importance and high in satisfaction. Seven out of the ten most important issues to users also ranked high in satisfaction.

Issues of High Importance and Low Satisfaction

Issues of high importance and low satisfaction included:

- ability to deal with confidential issues at the office;
- ease of concentration in the office;
- conversational privacy in the office;
- ability to make telephone calls in the office;
- ability to handle mail/text at home.

It is interesting that, although five issues were rated high in importance and low in satisfaction, these "low" satisfaction ratings were still quite high, especially in comparison to the other offices that were studied; the lowest satisfaction mean for these issues was a 3.35, much higher than the lowest mean for any of the other sites, which tended to fall at 2.5 or less.

Issue Indexes

In order the more clearly demonstrate the impact the new office environment had on user satisfaction and work effectiveness, the ten most important survey issues were grouped into seven major categories. These categories were:

- work effectiveness;
- communication;
- technology;
- home;
- privacy;
- storage/personalization;
- alternative space/design.

Again, the ten issues that, on average, were most important to users were:

- ability to receive mail while in the office;
- access to computers in the office;
- ability to receive messages when out of the office;
- ability to deal with confidential issues;
- ability to receive telephone calls in the office;

- ability to communicate with managers;
- sense of being valued by the organization;
- ease of concentration in the office;
- ability to communicate with coworkers;
- conversational privacy.

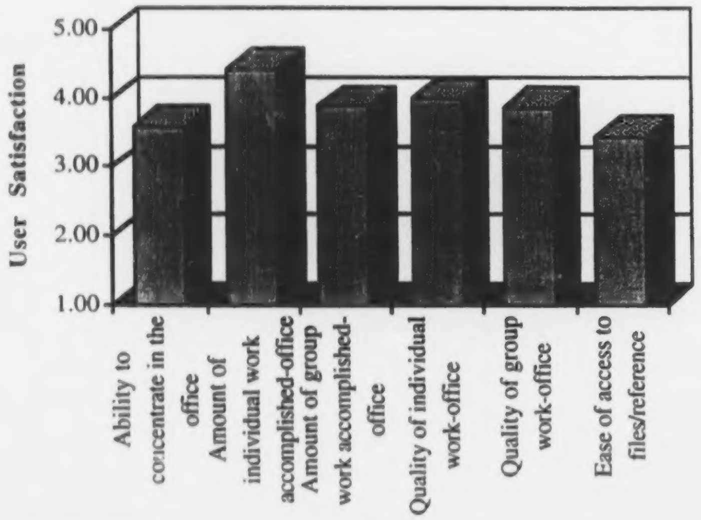
The satisfaction ratings for these ten issues, plus the satisfaction ratings for additional issues that were added to give a better description of the system according the seven categories, were graphed. An average of all the issues under a given category was also graphed to show the satisfaction rating in more general terms.

It is important to note here that, because SOL was a new company and because the users had been working in the same office environment since the company began, all of the satisfaction issues were rated in terms of users' current satisfaction , rather than comparing their satisfaction with that of the previous environment. At all of the other companies and sites we researched, users were asked to compare their satisfaction with the current office system to the previous office system for the same issues.

Work Effectiveness Issues

The ease of concentration was the only work effectiveness issue included in the list of ten most important issues. Quality and amount of individual

Figure 104: Work Effectiveness Index



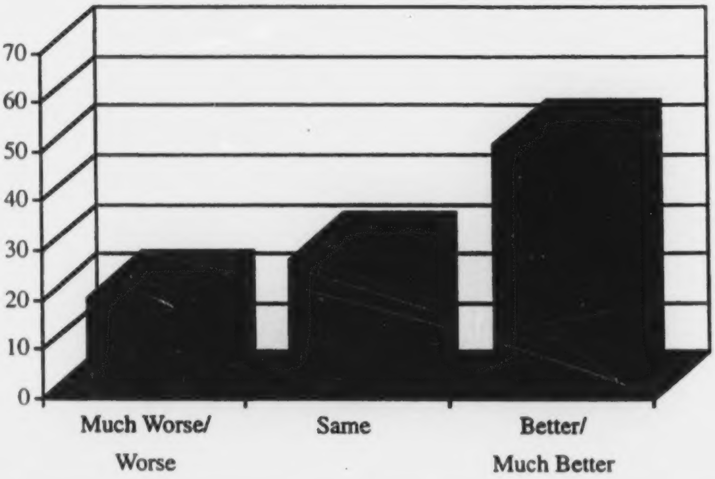
work accomplished in the office, quality and amount of group work accomplished in the office, and ease of access to files and reference materials were also added to the average index.

User satisfaction with the work effectiveness was rated high, with an average index of 3.9 (see Figure 104: Work Effectiveness Index).

Users felt the quality and amount of both individual work and group work were quite good in the open office environment. Traditionally, individual work is rated a bit lower in terms of satisfaction in an open environment because of noise and distractions in the office. But because SOL had a number of workstations scattered throughout the building and flexible hours to allow employees to work at a time that was appropriate for them, individual work appears not to have been a problem; employees could find a place to work in the office where they would not be disturbed, or they could come into the office (or work at home) during off-hours if they could not work during the day.

The one work effectiveness issue that had a mixed response was ease of access to files and reference materials. Approximately 20% of the survey respondents rated this issue as much worse/much worse in the new environment (see Figure 105: Frequency Distribution for Ease of Access To

Figure 105: Frequency Distribution for Ease of Access to Files/ Reference Materials in the SOL Headquarters Office



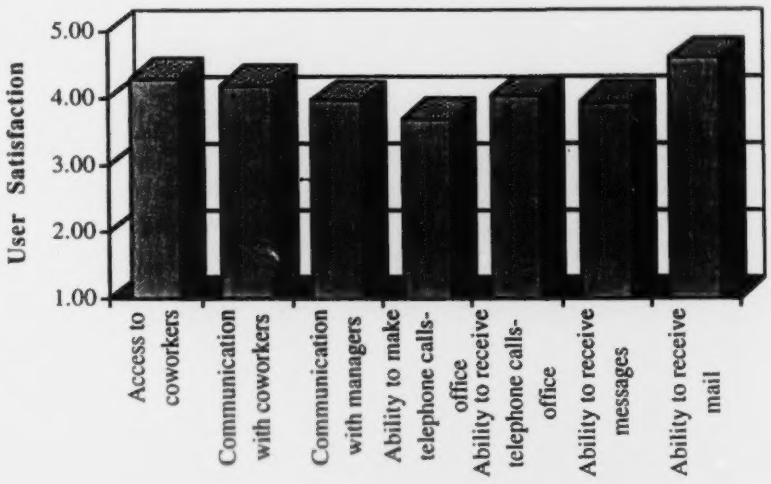
Files and Reference Materials—SOL). Over 50% rated this issue as better/much better.

Communication Issues

Five of the ten most important issues under the category of communication were: ability to receive mail; ability to receive messages when out of the office; ability to receive telephone calls; and ability to communicate with managers and coworkers. Two additional issues were added to the index: access to coworkers in the office and the ability to make telephone calls in the office.

The communication average index was the highest average index of all the categories studied on the survey, with 4.09 (see Figure 106: Communication Index). All of the issues were rated on average around a 4.0 or higher. The open environment and the cordless telephone system made it easy for users to communicate with both internal and external customers.

Figure 106: Communication Index



Internal Communications

From the beginning of the design and planning stages, SOL users wanted to create a working atmosphere free of the physical and emotional barriers to communication traditionally found in offices. Walls and anything that could be construed as "status" oriented were excluded from the design. The owner of the company had no special privileges, such as a permanent parking space, a private office, or secretaries. When in the office, she operated in the same manner as the other employees.

This type of system made employees feel very comfortable with internal communications. Managers were frequently seen walking around the office, available for anyone who needed their time or attention. Coworkers could also easily be found in the office because of the lack of visual barriers.

External Communications

All employees had a cordless telephone while they were in the office. Five additional stationary telephones were also located in the office. All calls could effectively be answered by one of these two methods. If a call came in on the permanent telephone line, they could easily be transferred to the cordless lines. When out of the office, many people had car telephones, and/or could transfer their calls to their home telephone line. Essentially, the system allowed users to be contactable 24 hours a day if that was what they desired.

This type of communications system provided an effective means of handling all calls that came into the company. The issue that was rated the lowest was ability to make telephone calls in the office. This rating, while lower than the other communication issues, was still fairly high, however, with a mean of approximately 3.5. This lower score may have been the result of noise in the office.

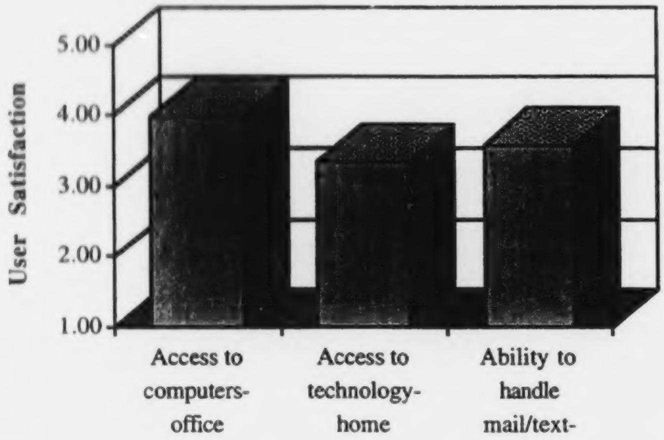
Technology Issues

The only issue under technology from the list of ten most important issues was access to technology in the office. Access to technology at home and ability to handle mail/text at home were also added to the average index.

The technology issues were rated with an average index of 3.64 (see Figure 107: Technology Index). The lowest issue was access to technology at home. The distribution of technology for working at home was not uniform; only those users who could justify the need were issued equipment. Interviews indicated, however, that many employees who were not given technology felt they could benefit from such equipment, but were not working at home enough to justify the need. For example, several supervisors mentioned they did not have equipment at home, which made it necessary for them to make special trips several times a month simply to use the computers. While the amount of time they actually worked on the computers was fairly small, the provision of technology at home would have alleviated the need for these trips.

The fact that the technology index was so high is surprising in its own right. The technology aspect of the SOL office system was probably the least emphasized aspect. Unlike several of the other non-territorial offices, technology was not used as a selling point or bargaining tool, but was rather an "enabler" to getting work done. The system itself was not very sophisticated, but was appropriate for what it was being used for and who it was being used by. Interviews indicated that, beyond the desire to have technology at home, users did not give much thought to the technology as a whole.

Figure 107: Technology Index



Home Issues

Users did not rate any home issues in the list of ten most important issues. The issues that were added to the index included: access to technology from home; ability to handle mail/text at home; quality and amount of individual work performed at home; ability to concentrate at home; and ability to communicate with coworkers at home.

The home issues had a average index of 3.59 and followed a fairly typical pattern in terms of user satisfaction; individual work and concentration was rated high, while communication with coworkers was rated lower (see Figure 108: Home Index).

Figure 108: Home Index

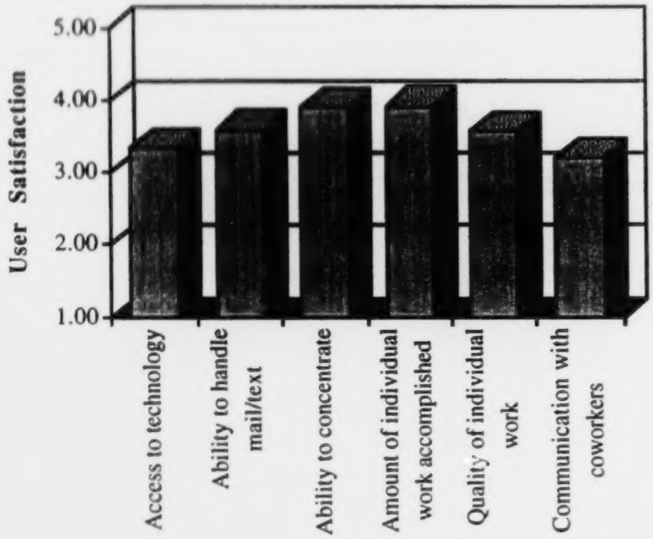
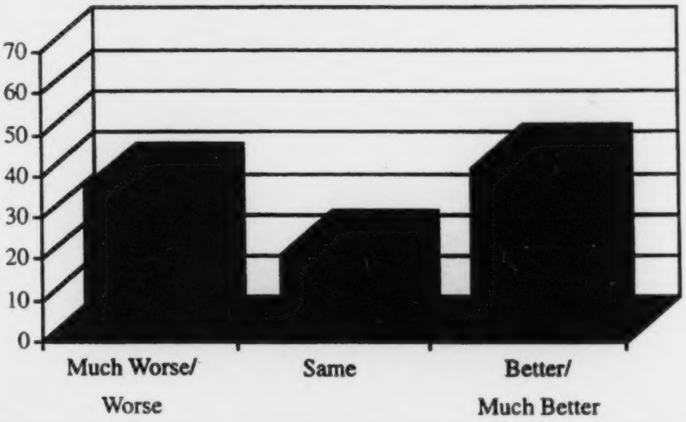


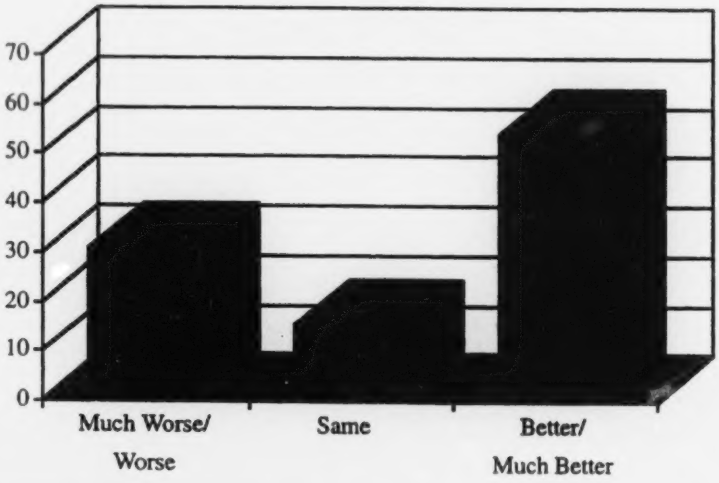
Figure 109: Frequency Distribution for Ability to Communicate with Coworkers at Home in SOL Headquarters Office



Several of the home issues had interesting frequency distributions. The ability to communicate with coworkers at home, although it had a mean score of over 3.0, was rated almost equally on either end of the scale (see Figure 109: Frequency Distribution for Ability to Communicate with Coworkers from Home—SOL). Just under 40% of the respondents rated their satisfaction as much worse/worse, while slightly over 40% rated it better/much better.

The satisfaction ratings for access to technology at home, while not as diverse as the ability to communicate, also had mixed responses. Approximately 30% of all survey respondents rated their satisfaction as much worse/worse than the previous system, while over 50% rated it as better/much better. This split in the satisfaction scores may be related to the fact that not all employees were given technology for working at home. Those that did not have technology—and felt that they needed it—may account for the 30% who rated this issue poorly.

Figure 110: Frequency Distribution for Access to Home Technology—SOL

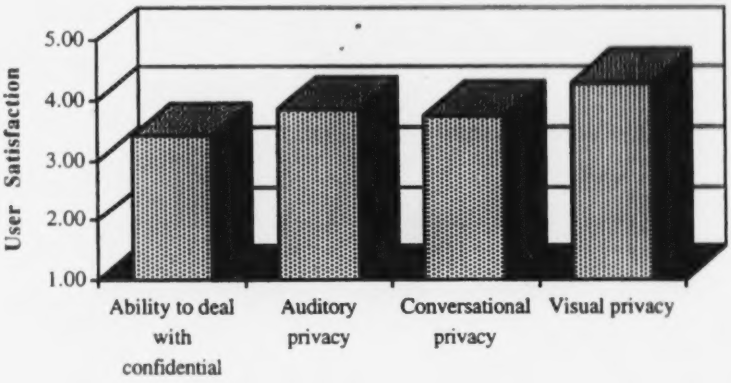


Privacy Issues

Ability to handle confidential issues at the office and the degree of conversational privacy were both rated in the list of ten most important issues. We also looked at auditory privacy and the degree of visual privacy.

Users rated overall privacy issues with an average index of 3.82 (see Figure 111: Privacy Index). This satisfaction rating was surprisingly high for an open plan environment. Usually in an open plan environment, increased communications result at the expense of privacy. One reason this score was so high comparatively could be because users were not comparing their satisfaction with that of a closed office environment, but were simply rating their satisfaction with the way privacy worked in the current environment.

Figure 111: Privacy Index



Another explanation for the high satisfaction rating had to do with the number and variety of workspaces users could choose in the office. Users could work in the highly-visible traditional workspaces, or they could work in the less-visible nontraditional workspaces depending on the level of privacy they desired.

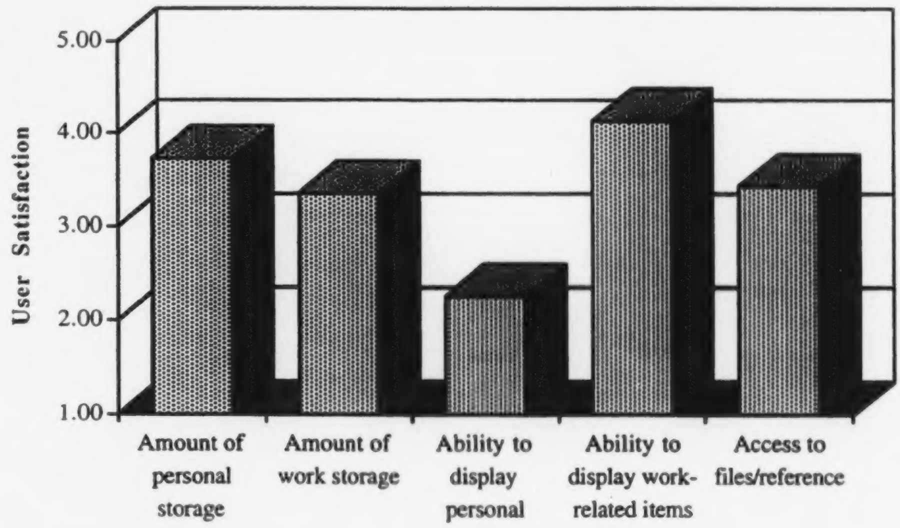
The lowest issue was ability to handle confidential issues. The fact that there were no offices located anywhere in the headquarters could make this task difficult. Again, however, there were areas in the office that users could work that were more private than others and made this task possible.

Storage/Personalization Issues

None of the storage/personalization issues on the survey were rated high in importance by users. To help describe the effect on these issues as a result of the office environment, we examined the following: amount of personal storage; amount of work storage; ability to display personal items; ability to display work-related items; and access to files and reference materials.

Issues had an average index of 3.38, however the scores were quite varied; the satisfaction rating for ability to display work-related items was over 4.0, while ability to display personal items was just slightly over 2.0 (see Figure 112: Storage/Personalization Issues). The remaining issues had average satisfaction ratings over 3.0.

Figure 112: Storage/Personalization Index



One explanation for the high satisfaction rating for ability to display work-related items was the fact that employees were able to design their own environment and had an influence in the type of work items they wished to display; users actually purchased all of the furniture and decorative items in the office (or were able to heavily influence the purchase/display of items).

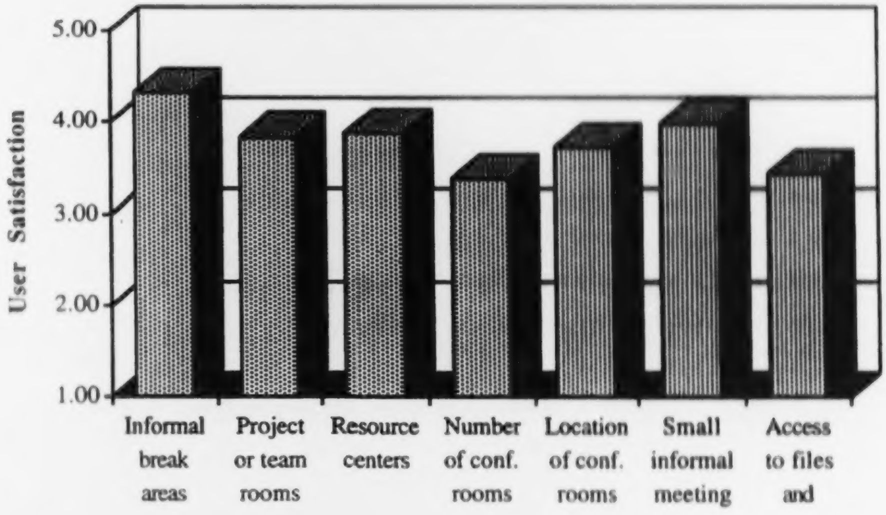
Personal items were difficult to display because users did not have a permanently assigned space. This issue, however, was rated very low in importance.

Alternative Space/Design Issues

The issues that were grouped under this category included: informal meeting areas; informal break areas; dedicated project or team rooms; resource centers; and number and location of conference rooms. In addition, satisfaction with access to files and references was included in the average index.

The average index for the alternative space/design issues was a 3.79 (see Figure 113: Alternative Space/Design Index). The environment was rated highest in informal break areas and informal meeting areas. Surprisingly, the office environment was rated high with regards to the availability of project/team rooms and conference rooms, even though these facilities did not exist in the environment. In order to interpret these scores, it was necessary to understand how people worked in the environment. Although there were not designated team rooms or conference rooms, specific areas in the office were used for these purposes. For example, the large dining room table on the second floor was a popular location for team meetings and for conferences; clients were often entertained in this area. Therefore, while the specific "rooms" were not available, the functions were supported by the office design.

Figure 113: Alternative Space/Design Index



Overall User Satisfaction with SOL Headquarters and The Implementation Process

The major thrust of the SOL project was not the development of a non-territorial office, but the development of a new system of management. The non-territorial office was a result of this new management philosophy. Because this project was the first of its kind at SOL, it was not possible to discuss changes in the implementation process over time. The following, however, is a brief review of the implementation process for this particular site.

- The company began working on their facility in January of 1992. Brainstorming meetings, consultations with an architect, and purchasing and construction were all open for users who were interested in helping in these areas.
- A variety of workspaces, both formal and informal, were provided for the employees (e.g., traditional workstations, kitchen areas, "living rooms," "dining rooms," etc.).
- Users were provided with limited but adequate storage areas.
- Special features to were added to provide a relaxing atmosphere for employees, as well as special "family" areas.
- Users had access to both PCs and laptops in the office. In addition, many users had PCs issued to them to work at home. Those that did not could use one of the pooled laptops.
- Communications were handled through voice mail, e-mail, cordless telephones, and direct dial numbers.
- Users could acquire cordless telephones or messagers depending on their need requirements.

The SOL Cleaning Company Implementation Process

Applying the IWSP rating system (see *IWSP's Rating System for the Implementation Process* in the IBM, UK section), the planning, design, and technology aspects were scored and plotted. Strong emphasis was placed on all aspects of the project, particularly on design considerations (see Figures 114, 115, and 116 on the following pages).

Overlaying the three components with user satisfaction indicates that user satisfaction was quite high. While we were not able to compare other

Figure 114: The Planning Process for SOL Headquarters

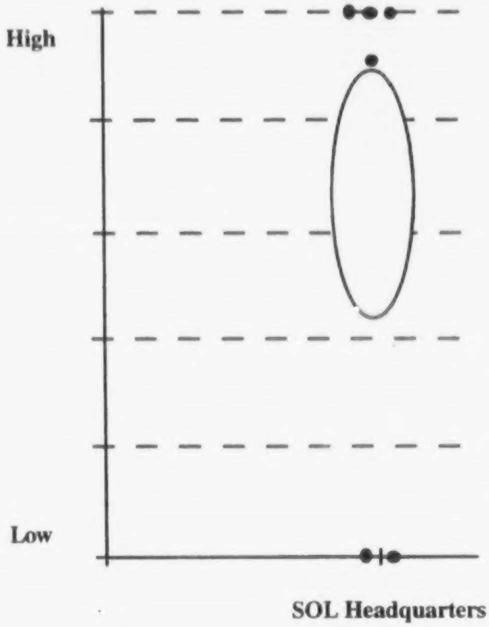


Figure 115: The Technology for SOL Headquarters

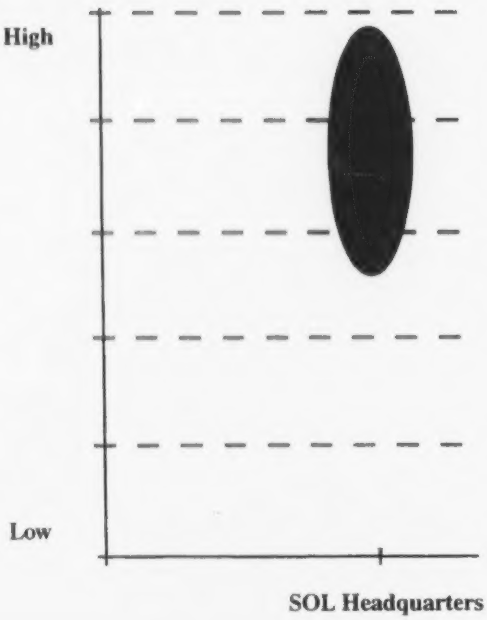


Figure 116: The Design for SOL Headquarters

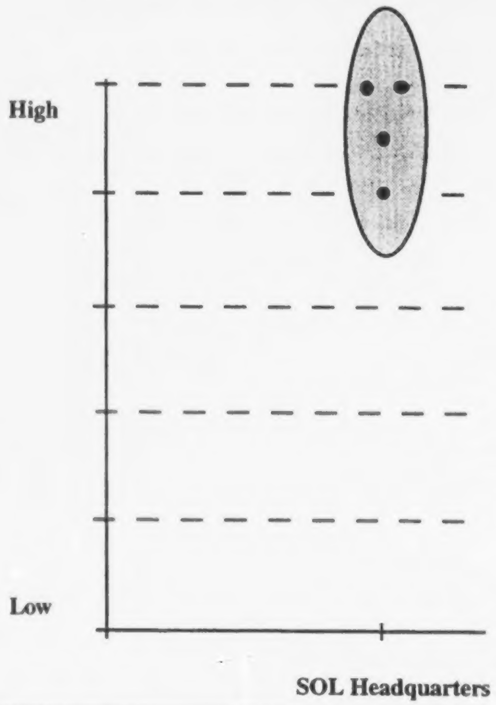
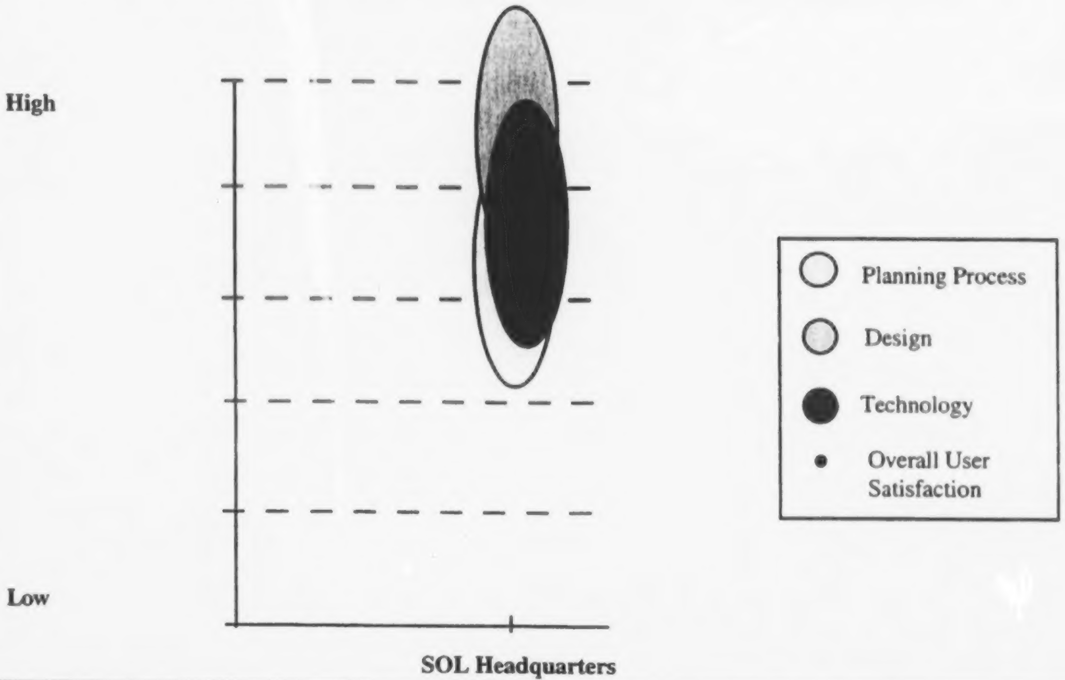


Figure 117: Planning, Design, and Technology for SOL Headquarters



SOL sites to the headquarters, the following section discusses some aspects that made the headquarters unique compared to some of the other workplace projects we studied.

- Unlike any of the other alternative workplace arrangements that we studied, the SOL office project was *process*-oriented, rather than solution-oriented. The office design was a result of the new management philosophy about how work should be done; the employees decided the most effective way for them to work within this framework, and then created an environment to support this way of working.

- The environment acted as an "enabler" to getting work done, rather than being the focal point of the project.

- As was the case with the DECsite Natural Office, the SOL project was business-driven, rather than cost-driven. The primary issue was finding the best means of accomplishing work tasks, not reduction of office costs.

- The SOL company was one of the only organizations we studied that thought of the workplace in terms of an *integrated* workplace strategy. Employees were encouraged to work whenever and wherever they needed to get the work done. The management policies and practices actively supported this way of working by looking at results, not time in the office.[16]

- User involvement was much greater at SOL than at any of the other sites we researched. The fact that users were so actively involved in all stages of the project goes back to the management philosophy of employee empowerment. The main premise was that since employees worked in the environment, they should have direct influence on how that environment should be designed.

- One major difference between SOL and many of the other organizations (with, perhaps, the exception of Shimizu) was the job types that were involved in the flexible office arrangement. In many of the cases we examined, the employees who worked in the alternative office arrangements were sales or consulting employees, who spent the majority of their time out of the office with clients. While this population existed at SOL as well, a number of employees traditionally worked primarily in the office. In many examples of non-territorial offices, people who work in the office the majority of their time are usually considered "exceptions" and are given their own workstations. This was not the case at SOL.

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[16] At the time of this report, the owner was having a difficult time trying to comply with the labor laws in Helsinki in that the law required her to submit timecards for all of her employees. The owner was willing to comply, but had no means to measure actual employee hours. This situation was a key example of how governments could act as inhibitors to new ways of working.

Lessons Learned

Lessons learned from studying the non-territorial office at SOL included:

- The high level of user involvement was met with high overall satisfaction and work effectiveness ratings in the Cornell Workplace Survey. While certainly there were many factors contributing to the high satisfaction ratings, the fact that users controlled the design of the office and influenced what technology would best support their work also played a substantial role in the high employee response.

- Almost every user surveyed or interviewed was a "champion" of the system. This was, perhaps, due to the fact that users were so actively involved in the implementation process. Instead of simply one or two people pushing and "nurturing" the office concept, the entire office was willing to stand behind the arrangement and continue working in this fashion, rather than falling back on traditional work behaviors.

- Management support for flexible working (both in terms of policy and practice) resulted in more people taking advantage of flexible work. People at SOL were more willing (and able) to work flexibly than we had witnessed in other companies.

- One familiar drawback to the flexible working system was the fact that users felt that they were working much more than they were before coming to SOL. This is a common complaint when the boundaries of the office are removed. Instead of having the organization help control the hours that they work, employees must learn to control their own work patterns. Many people have a difficult time learning when to "shut down" work because in a seamless work environment it is so easy to work all the time.

Conclusion

We discuss below each of the specific research questions identified at the onset of the ***Innovative Workplaces*** study with reference to SOL Cleaning Company and the headquarters. Later these questions will be discussed in more detail, with reference to all the organizations studied.

- *What factors (e.g., planning and design process, nature of technology, the design of the setting) tend to change the most as projects evolve?*

As we were only able to study one implementation SOL due to time constraints on the project, we were unable to answer this question.

- *What aspects of the new workplace system tend to become standardized or uniform?*

Again, as we were only able to study one implementation SOL due to time constraints on the project, we were unable to answer this question.

- *As organizations expand their implementation of new workplace strategies (within or across sites) does employee response tend to improve, remain the same, decline, or is there no consistent pattern at all?*

Until further studies can be done on the spread of this concept throughout SOL, we are unable to answer this question specific to SOL.

- *What differences are there in terms of cost and employee response (satisfaction, work effectiveness) as a function of whether the workplace system is primarily cost-driven versus business-driven ?*

The business-driven projects had a distinctly different focus than the cost-driven projects; the major emphasis was on improving efficiency. Different features were added to the environment that may not have been otherwise if the project had been primarily cost-based. In addition, the design and the technology tended to be more in line with how employees actually worked.

- *What are the organizational implications of solution-oriented vs. process-oriented workplace systems?*

As was discussed earlier, SOL had the distinction of being the only process-oriented project that we examined. The beginning point was to first determine a better way of working. Then, an environment was designed that supported this way of working. In other words, employees/planners did not start with any preconceived notion of how the office would look. In many of the solution-oriented projects, planners went in with an environment (or aspects of an environment) that had been implemented for a different group and tried to implement the same solution for the next group. They often did not consider whether this environment would best support how employees worked (or should work).

- *How does the implementation process change as the project moves from the pilot stage to widespread implementation? Is it necessary to focus as much attention on all three factors (design, technology, and planning process) in second and third installations to ensure similar success patterns as those achieved in the pilot project?*

Until further studies can be done on the spread of this concept throughout SOL, we are unable to answer this question.

- *What is the nature of organizational learning that occurs as a function of whether the workplace system is process- vs. solution-driven, cost- vs. business-driven, or part of a strategic initiative versus an independent initiative?*

Until further studies can be done on the spread of this concept throughout SOL, we are unable to answer this question specific to SOL.

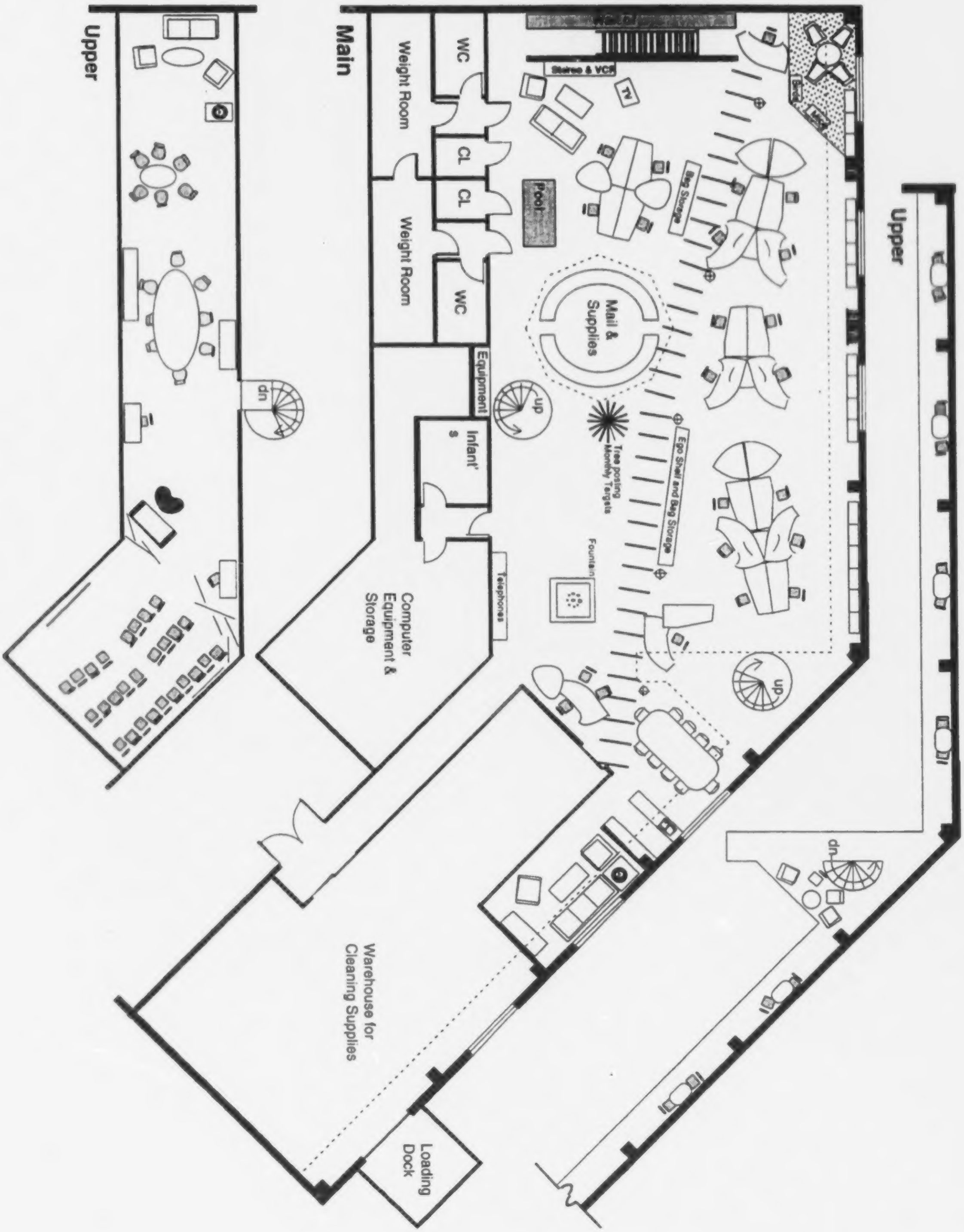

Upper
Main
WC
Weight Room
CL
CL
Weight Room
WC
Stereo & VCR
TV
Bag Storage
Pool
Mail & Supplies
Equipment
up
Infant's
Tree posting Monthly Targets
Ego Shell and Bag Storage
Fountain
Telephones
Computer Equipment & Storage
up
dn
Upper
dn
Warehouse for Cleaning Supplies
Loading Dock

Figure 118: Floorplan of SOL

Shimizu Institute of Technology—Tokyo, Japan

Workplace Strategy Overview

Shimizu Institute of Technology, located in Tokyo, Japan, is the research arm of Shimizu Construction, one of Japan's largest construction companies. Shimizu has over 350 researchers working on subjects related to construction and design.

Shimizu has been working with the concept of non-territorial offices since early 1987 (see Figure 118: Shimizu Institute of Technology Timeline). Shimizu has implemented three non-territorial offices, or "free-address" offices as they refer to them. The three implementations were independent and were not part of a larger strategic effort to move to free-address.

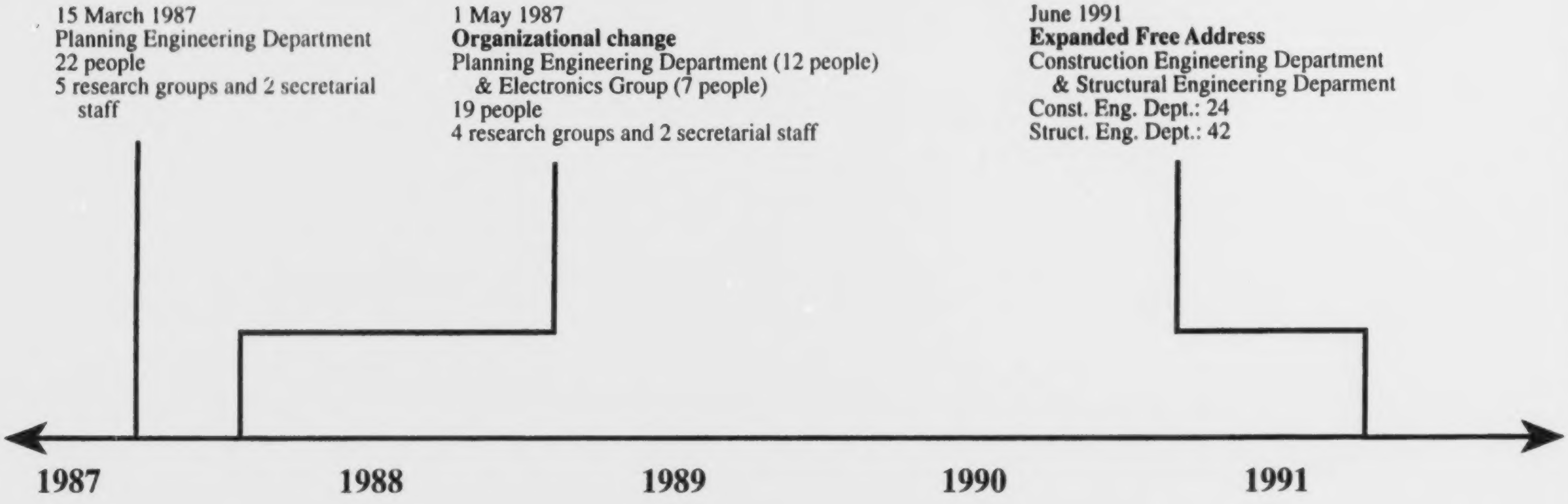
Free-address offices, like non-territorial offices, are offices where employees are not assigned to a particular desk or workstation, but rather can work at any unoccupied workstation.

Goals/Drivers of the Free-Address Office

- *Improve the overall office environment.*
- *Develop a space planning system that allows for small changes in staff size without requiring changes to the environment.*

Photo 39: Shimizu Overall

Figure 119: Shimizu Institute of Technology Timeline


15 March 1987
Planning Engineering Department
22 people
5 research groups and 2 secretarial staff
1 May 1987
Organizational change
Planning Engineering Department (12 people) & Electronics Group (7 people)
19 people
4 research groups and 2 secretarial staff
June 1991
Expanded Free Address
Construction Engineering Department & Structural Engineering Deparment
Const. Eng. Dept.: 24
Struct. Eng. Dept.: 42
1987
1988
1989
1990
1991

Free addressing was first introduced at Shimizu to help improve the overall office environment. Although there was a cost constraint (the overall cost of the office could not increase), the primary driver was to improve the way in which people worked. A secondary driver was to develop a space planning system that would allow for small changes in staff size without requiring changes to the physical environment.

To understand why improving the quality of the environment had such as strong influence, it is necessary to go into some background about how a typical Japanese office is designed. In general, Japanese offices are very compact. An office typically has an open area filled with small desks in rows facing each other, with little to no separation between desks, and very little privacy. Workspace tends to already be at a minimum level.

Free-addressing offered Shimizu an affordable means of improving their office environment by giving employees more space to work, providing employees with a variety of workspaces, and giving employees more privacy.

The first implementation of free-address occurred in the Planning and Engineering Department in 1987. The next two implementations occurred at the same time in Construction and Structural Engineering in 1991. The three free-address offices at Shimizu were all based on a standard solution, with minor refinements in the latter two implementations.

Although the three projects had similar implementation processes (e.g., similar planning process, design, and technology), only the first implementation was successful. Shortly after the free-address concept was introduced in the second two departments, the employees converted back to their old way of working, where each person was assigned a permanent location.

The fact that the later implementations did not continue to operate in a non-territorial fashion prevented the IWSP research team from collecting survey data from these two groups. We can, however, assume that user satisfaction was lower than that of the first office, else they would have survived.

Principles of the Free-Address Office

- *Employees are not assigned a personal workspace, but can work at any unoccupied workstation(s).*
- *Desk-to-employee ratio was higher than 1:1 in all implementations.*

Cost Savings Associated with Free-Address Offices

The primary goal of the free-address offices was to give users more work space by allowing them to spread their materials over several unoccupied workstations. A secondary goal was to allow for increases in staff without having to totally redo the layout. In all three cases, the number of workstations was larger than the number of users. Table 21 illustrates the increases in space and number of workstations for each department.

Table 21: Cost Savings Associated with Free-Address Offices

	Planning		Structural		Construction	
	Previous Environment	Free-Address Environment	Previous Environment	Free-Address Environment	Previous Environment	Free-Address Environment
Total Area	557 sq. ft.	557 sq. ft.	1929 sq. ft.	2204 sq. ft.	1102 sq. ft.	1929 sq. ft.
Employees	18	24	42	42	24	24
Total workstations	24	30	44	57	25	40

Summary of Free-Address Installations Across Time

Methodology

The same profiles used to compare sites at the other organizations were used to compare the three installations of free-address offices at Shimizu. To some extent, these profiles were tailored for Shimizu, using terms that are more specific to this company. Overall, however, the same profiles were used across all companies.

A more detailed description of each of the projects at Shimizu can be found in Appendix C.

The Planning Process

The six major areas identified as important in the process of planning new office environments included: project ownership by the business/department/group; data collection on work time-activity patterns; collaborative, cross-departmental involvement; end user involvement; informing users; and training . These six areas were then broken down into more detailed components and compared across each implementation.

Figure 120 summarizes our findings for each of the free-address office installations.

Project Ownership

The three departments involved in the free-address installations had very little to no ownership of the project. The first implementation was owned by the Planning and Engineering Department, since the senior manager of this department originally developed the concept of free-address. He and one of his staff jointly developed a plan for how a free-address office should look and operate. The second and third implementations, however, were also owned by the Planning Department. The senior manager took the same plan used for the Planning Department and installed it in both the Construction and Structural Engineering Departments with very little alterations.

Figure 120: Shimizu Free-Address Office Planning Process

		Planning and Eng.	Construct. Eng.	Structural Eng.
Project Ownership:	Departments/Groups/Businesses	●	○	○
Groups/Teams/Committees:	Steering Committee	○	○	○
	User Representatives (non-managers)	○	●	●
	Managers	●	○	○
	Other	○	○	○
Collaborative Team Project:	Departments/Groups/Businesses	●	●	●
	Facilities/Premises Management	○	○	○
	Space Planning Consultants	○	○	○
	Management Information Systems	○	○	○
	Human Resources	○	○	○
Data Collection:	Occupancy Patterns for Group/Site	●	●	●
	Needs Analysis for Group/Site: Space	●	●	●
	Technology	●	●	●
Method of Informing or Involving End-Users (non-managers):	Workshops	○	○	○
	Seminars	○	○	○
	User meetings	●	●	●
	Bulletins/Newsletters	●	●	●
Training:	Free-Address Offices/Technology	○	●	●

○ Did not have
● Did have
▨ Occurred post-implementation

Project Teams/Committees Established

Very few teams or committees were formed in any of the three installations to help guide the planning and design of the project. In the first installation, one of the senior manager's staff helped to design the project. In the second and third installations, this involvement was not necessary because the project had already been defined in the first implementation.

User groups were established in both the Construction and Structural Engineering Departments. The purpose of these user groups, or "liaisons," was to help the Planning department understand user needs and identify potential problems. These groups were able to influence the design of the project to a certain extent, but this influence was limited. For example, the number of workstations, overall design of the offices, the types of storage facilities, and the technology were all determined by the senior manager of the Planning Department, while the liaisons were responsible for the addition of task lights on some of the workstations, the removal of drawers from under the desk tops, and the addition of larger casters on the mobile pedestals to facilitate movement on the carpets.

Collaborative Team Effort

Beyond the users from the individual departments, none of the three projects was collaborative across areas of expertise.

Data Collection

The type of data collected during the planning stage was consistent across all three installations. The primary difference in data collection was not the method used to obtain information, but rather the length of data collection period. For example, the time-lapse photography data collection to help determine occupancy patterns took place over a period of one year in the first implementation, but lasted only one week in the second and third implementations.

End User Involvement

While few users were actually involved in the planning and design process in the first implementation, users were more informed of the progress than they were in succeeding implementations. Information began filtering to users two months before the actual office design was implemented, giving users plenty of time to discuss concerns or questions.

In the second and third installations, users had a total of four hours of instruction and question-and-answer sessions, but these meetings occurred very close to the time the offices were implemented. Users had very little time between when they were first informed about the new office environments and actual implementation to think about the implications such changes would have on their work patterns.

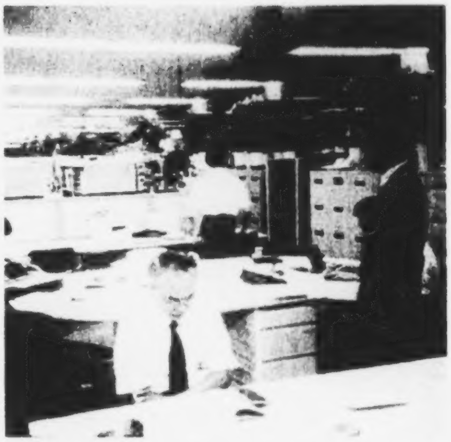


Photo 40: Shimizu Overall Office

Training

As mentioned above, training occurred in the four hours of instruction on how the offices were to look and operate in the Construction and Structural Engineering Departments. No training was provided in the first implementation.

Summary of Planning Process Over Time

To summarize some of the changes in the planning process:

- Ownership of the project decreased as the project moved into the second and third installations. The idea and design of free-address originated in the Planning Department, and was viewed as "their project."
- The data collection became less intensive over time. The period of time dedicated to data collection went from one year in the first implementation to one week in the second and third.
- The method by which users were informed of the project changed in the later two implementations. In the first implementation, information began filtering to employees two months before the implementation, whereas users were not informed of the second and third installations until very near the time of implementation.

Design

The major goal of the design of a work environment is to support the ways in which people work. For non-territorial offices, some of the major attributes that help users work more effectively include:

- Multiple forms of work areas to support different tasks, such as concentrative work, team projects, small meetings, etc.
- Adequate storage for both personal and work related materials.
- Flexibility to handle peak periods and growth in the department (both temporary and permanent).

Photo 41: Shimizu Workstations

- Common areas for meetings (formal and informal) and break-out areas for relaxation.
- Surroundings that encourage communication, collaboration, and exchange of ideas without negatively impacting the productivity of the group.

Figure 121: Shimizu Free-Address Office Design describes some of the physical attributes of the free-address office projects. The key aspects for Shimizu's design profile are somewhat different than the profiles used for the other organizations. These differences stem from cultural differences in the workplace; what is important or an improvement in a Japa-

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Figure 121: Shimizu Free-Address Office Design

		Planning and Eng.	Construct. Eng.	Structural Eng.
Multiple Workstations:	Open primary workstations	●	●	●
	Open primary workstations with semi-partitions	●	●	●
	Private workstations with low/high partitions	●	●	●
	Meeting table	▨	●	●
	Touch down workstations	○	○	○
	Work rooms/Quiet rooms	○	○	○
	Private office accessible if unoccupied	○	○	○
	Dedicated visitor workstations (dept.)	○	○	○
	Dedicated visitor terminals (location)	○	○	○
Storage Alternatives:	Mobile pedestals	●	●	●
	New personal storage cabinets	○	○	○
	Mid-level storage cabinets	●	●	●
	"Moving Rack" storage areas	○	●	●
	Floor-to-ceiling common storage areas	●	○	○
Common Areas:	Conference Rooms	○	○	○
	Break-Out Areas	▨	●	●
Design Considerations:	Low panels	●	●	●
	High panels for privacy	●	●	●
	New furniture	●	●	●

○ Did not have
● Did have
▨ Occurred post-implementation

nese work environment is quite different from that of a Western office (see *Part I* of this report for more discussion).

Multiple Workstations

The first installation originally had three large rectangular tables down the center of the room, each made up of six desks. In the following implementations, one of these large tables was converted to an oval meeting table comprised of two desks and two semicircular ends. This modification was also made in the first implementation.

The offices also had private workstations with low and high partitions.

The offices did not provide users with any additional workspaces, such as private offices, work rooms, or touchdown stations.

Storage Alternatives

The storage alternatives were similar across all implementations (mobile pedestals, mid-level common storage, large common storage areas), with the exception of "moving racks" replacing the floor-to-ceiling storage in the second and third installations. These moving racks were open storage shelves that could be rolled together for storage or apart for access.

Common Areas

No common areas were designed into the free-address offices in the first implementation. In the second and third implementations, a tea-break area was added for the three departments.

Design Considerations

Low and high panels were added to all of the departments to help facilitate worker privacy. Small partitions were placed on the large tables to help separate secretarial staff from the research staff, while high panels were used to section off private work areas for the departments.

Summary of Design Over Time

The design of the free-address offices changed very little from project to project. The design had been decided upon by the Planning Department in the first implementation, and this design was implemented in the following two implementations. To a limited degree, certain aspects of the office were changed in the first implementation as a result of the second two implementations (e.g., the large rectangular table was converted to an oval meeting table).

Technology

Three areas of technology found to be important to the implementation of non-territorial offices included: technology available in the office; technology to support work outside the office; and technology to support communication. Figure 122: Shimizu Free-Address Office Technology depicts the technology Shimizu employed in each of the free-address offices.

Computers

The first implementation of free-address provided users with a high degree of technology to support work in a non-territorial office. Instead of relying primarily on stationary PCs at each of the workstations, laptop computers were issued that could be carried to the different work areas, as well as to client sites. In the succeeding implementations, the users were supplied with PCs at each of the workstations.

Voice Communications

As with the computers, the first implementation had a more mobile telephone system that did the following implementations. Users in the first free-address office were given cordless telephones to help facilitate mobility in the office. Users in the following projects were given stationary telephones with direct dialing numbers that were entered into the system at the workstation the user occupied on a given day.

Special Technology

No special technology was offered in any of the free-address installations. Users in the Planning Department (the first implementation), however, had the advantage of being able to bring their laptops with them to client sites. The stationary PCs in the later two projects did not allow for this type of flexibility.

Summary of Technology Over Time

To summarize the changes in technology :

- The technology became "less mobile" in the later implementations. The original technology supported a flexible, non-territorial office,

Figure 122: Shimizu Free-Address Office Technology

		Planning and Eng.	Construct. Eng.	Structural Eng.
Office Technology:	Laptop computers	●	○	○
	PC computers	●	●	●
	Access to printer, fax, modem	●	●	●
	Electronic diary/mail	○	○	○
Non-Office Technology:	Latest PC terminal	○	○	○
	Latest portable computer w/ modem	●	○	○
	Home Printer	○	○	○
	Fax	○	○	○
Voice Communications/ Telephone System:	Cordless telephones	●	○	○
	Direct dialing numbers	○	●	●
Special Technology Available to Users †:	Car telephones	○	○	○
	Customer site terminals (i.e., latops)	●	○	○
	Other	○	○	○

○ Did not have
● Did have
▨ Occurred post-implementation

† Equipment not part of standard technology package.
Available if user can justify the necessity.

while the technology in succeeding projects became more traditional, supporting "owned" workspace rather than non-territorial.

Employee Satisfaction and Work Effectiveness

To understand the changes in the work environment and the effect these changes had on user satisfaction and effectiveness, the IWSP research team conducted a standard workplace survey at the Planning and Engineering Department. The language barrier prevented the IWSP research team from personally conducting interviews and focus groups. Questions, however, were submitted to the department(s) and were conducted by a representative at the Shimizu organization. As mentioned above, due to the short life of the later implementations of non-territorial offices at Shimizu, it was not possible for us to collect survey data on these sites.

The survey data below represents the responses from first implementation of free-address offices.

This section presents some of the results of the interviews and surveys, and discusses the user work effectiveness and satisfaction ratings in relation to the changes in the office system and implementation process.

Table 22: Data Collection Techniques

	Total Number Conducted	Total Number of Locations
Cornell Workspace Survey	16	1
Focus Groups	11	3
Interviews	3	3
Personal Observation	—	3

Survey Background Data

User Profile

Job types of all the employees surveyed and interviewed fell into the following categories:

- secretaries;
- researchers.

The majority of respondents were classified as researchers (69%), while the remainder of respondents were secretaries or undefined job types (see Figure 123).

The users were fairly evenly distributed across age groups (see Figure 124). There were no statistically significant differences in the survey responses according to age groups.

Sixty-nine percent of all respondents had worked in the non-territorial office for over 25 months at the time the survey was conducted. The remainder of respondents had worked in the new environment from less than eight months to 24 months.

All but one of the respondents worked in open, individually assigned workstations before the implementation of the free-address office. These desks were arranged in a group layout as opposed to individual, separate desks.

Figure 123: Survey Respondents by Job Type

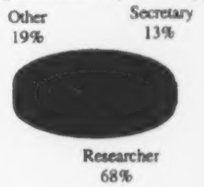


Figure 124: Survey Respondents by Age Group

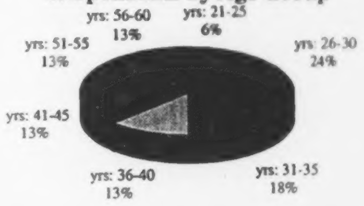
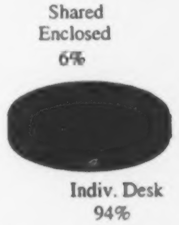


Figure 125: Survey Respondents by Previous Workstation



For more information on the survey and the rating system of the responses, please see the *Data Collection Methods* in the *Methodology* section. A complete survey can be found in Appendix D.

Benefits of the Free-Address Office Environment

Users identified three main benefits of the free-address office environment:

1) **No limitations on the amount of space:** When spaces were vacant, users could take up as many workstations as they needed.

2) **Flexibility in the office:** Users had the freedom to sit wherever they wanted, as well as change desks during the day.

3) **No status distinctions in the office:** Each user had the same equipment, furniture, storage, etc. available to them, regardless of status.

Disadvantages of the Free-Address Office Environment

The three main disadvantages/areas of improvement users targeted were:

1) **People not using the office flexibly:** While the office was designed with the concept of no one person "owning" space in the office, users commented that people actually tended to stay day after day in the same location.

2) **Noise/distractions in the office:** Because the workstations were unassigned, people often conducted meetings/team discussions in the center tables. These conversations were distracting to those trying to conduct more concentrative work.

3) **People move seats around without asking permission:** because the workstations were unassigned, users tended to use whatever space was available at the time. At times, a workstation appeared empty, but was actually temporarily unoccupied. The original "owner," therefore, would get "bumped" from the workstation.

Issues of Most Importance to Free-Address Office Users

The survey also asked users to rate the importance of survey issues. The ten issues that, on average, were most important to all users were:

- the ease with which users were able to concentrate in the office;
- ease of access to files and reference materials;
- access to computers in the office;
- amount of group work accomplished in the office;

- quality of group work accomplished in the office;
- communication with coworkers;
- amount of individual work accomplished in the office;
- quality of individual work accomplished in the office;
- ability to receive telephone calls while in the office;
- ability to receive messages while out of the office.

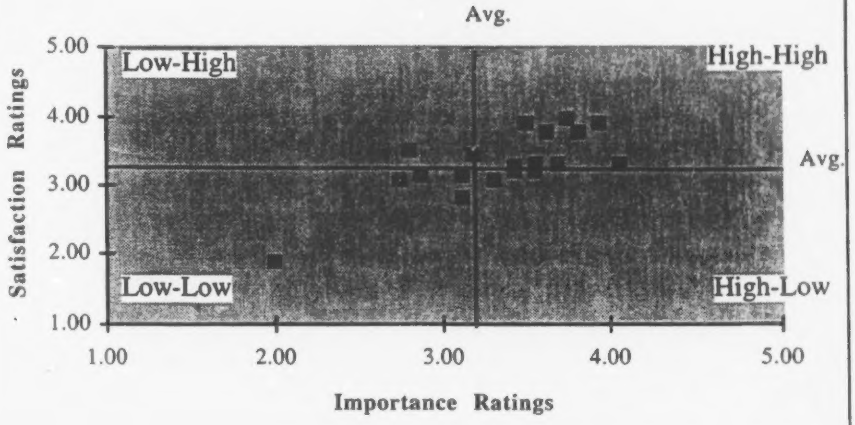
Issues of Least Importance to Free-Address Users

The three least important issues among free-address users were:

- the ability to display personal items;
- the sense of being valued by the company;
- the ability to make telephone calls in the office.

Again, as with the other sites that we have surveyed, it is important to note that the degree of satisfaction did not tend to influence the importance that users placed on the different issues. As the scattergram below depicts, users rated the importance of the ability to display personal items very low (2.00—the least important of all the issues examined on the survey). The satisfaction rating for this issue, however, was also quite low—1.88.

Figure 126: Satisfaction Compared to Importance



Issues of High Importance and High Satisfaction

Issues of high importance and high satisfaction included:

- ease of concentration in the office;
- ease of access to files and reference materials;

- access to computers in the office;
- amount of group work accomplished in the office;
- communication with coworkers;
- amount of individual work accomplished in the office.

Issues of High Importance and Low Satisfaction

Issues of high importance and low satisfaction included:

- quality of group work accomplished in the office;
- quality of individual work accomplished in the office;
- ability to receive telephone calls while in the office.

As was the case with the SOL headquarters, although these three issues were rated high in importance and low in satisfaction, these "low" satisfaction ratings were still quite high, especially in comparison to the other offices that were studied. The lowest satisfaction mean for these issues was a 3.06, much higher than the lowest mean for any of the other sites, which tended to fall at 2.5 or less (with the exception of SOL).

Issue Indexes

In order the more clearly demonstrate the impact the new office environment had on user satisfaction and work effectiveness, the ten most important survey issues were grouped into seven major categories. These categories were:

- work effectiveness;
- communication;
- technology;
- home;
- privacy;
- storage/personalization;
- alternative space/design.

Again, the ten issues that, on average, were most important to Shimizu free-address office users were:

- the ease with which users were able to concentrate in the office;
- ease of access to files and reference materials;
- access to computers in the office;
- amount of group work accomplished in the office;
- quality of group work accomplished in the office;
- communication with coworkers;

- amount of individual work accomplished in the office;
- quality of individual work accomplished in the office;
- ability to receive telephone calls while in the office;
- ability to receive messages while out of the office.

The satisfaction ratings for these ten issues, plus the satisfaction ratings for additional issues that were added to give a better description of the system according the seven categories, were graphed. An average of all the issues under a given category was also graphed to show the satisfaction rating in more general terms.

Again, it is important to note that, because the later implementations reverted to their previous office system before we had a chance to collect survey data in these locations, the graphs below are based on the survey responses from the first implementation only.

As was the case with the survey distributed to MCS #1 at Ernst & Young, the free-address office in the Planning and Engineering Department was one of the sites for our earlier research, and used an older version of the Workplace Survey. In that time, the Cornell Workplace Survey evolved into a more comprehensive survey of user satisfaction and work effectiveness. Occasionally questions that were asked in the later survey were not asked in the earlier survey (e.g., issues relating to working at home, conversational and visual privacy, etc. were not part of the first survey). Because of the elapsed time since the implementation, it was not possible to resurvey the original users to obtain this additional information.

Work Effectiveness Issues

Six of the survey issues from the ten most important issues to users fell under the category of work effectiveness. These issues were: the ease with which users were able to concentrate in the office; ease of access to files and reference materials; amount and quality of group work accomplished in the office; and amount and quality of individual work accomplished in the office.

The work effectiveness issues were all rated about the same to slightly better than under the previous office system, with an average index of 3.33.

User access to files and reference materials, the highest rated work effec-

Figure 127: Work Effectiveness Index

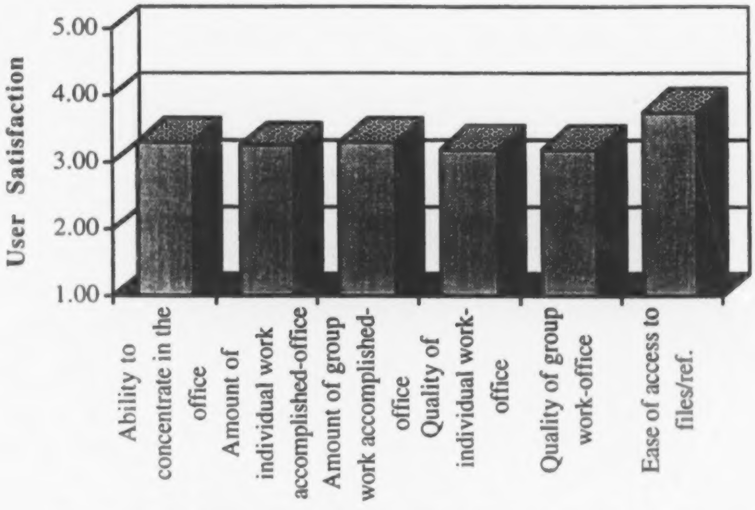
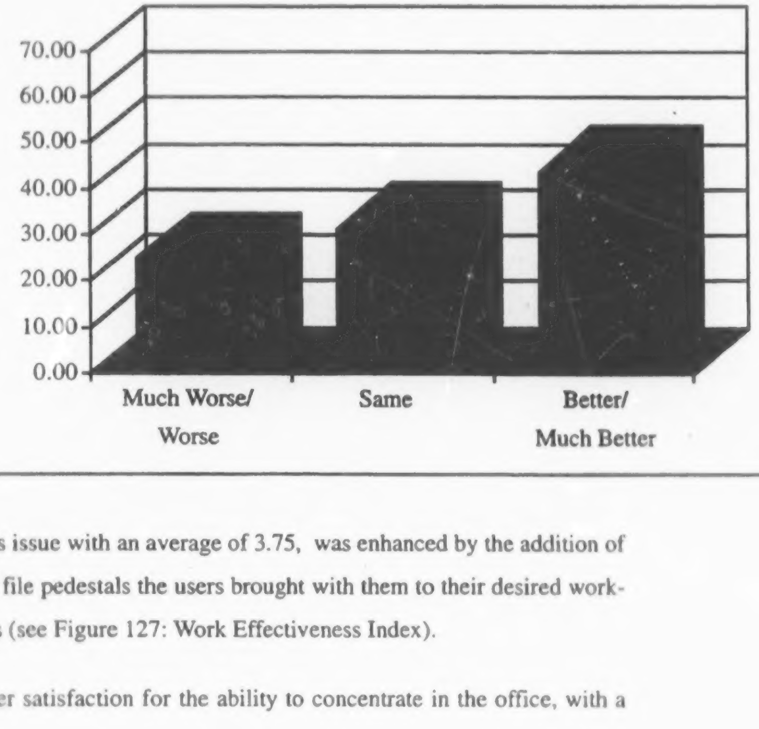


Figure 128: Frequency Distribution for Ease of Concentration—Shimizu



tiveness issue with an average of 3.75, was enhanced by the addition of mobile file pedestals the users brought with them to their desired workstations (see Figure 127: Work Effectiveness Index).

The user satisfaction for the ability to concentrate in the office, with a mean score of approximately 3.1, was rated at two extremes of the scale; over 25% of all respondents rated their satisfaction as much worse/worse in the free-address environment, while almost 45% rated it as better/much better (see Figure 128: Frequency Distribution for Ease of Concentration—Shimizu). One explanation for this mixed satisfaction score could be that the users who were dissatisfied with their ability to concentrate were not taking advantage of all of the workplace settings provided. Shimizu designed certain workstations primarily for concentrative work, which should have reduced the scatter in the satisfaction if used properly.

Users showed concern for the quality of both their individual work and the quality of their group work in the new environment. Concerns centered around the fact that the office tended to be noisy and distracting and that some people were not using the office flexibly, therefore interfering with users' ability to find group spaces to work.

Communication Issues

Three of the ten most important issues fell under the heading of communication: communication with coworkers; ability to receive telephone calls while in the office; and ability to receive messages while out of the office. Ability to make telephone calls in the office was also added to the communication index to help demonstrate the effect of the free-address on this component.

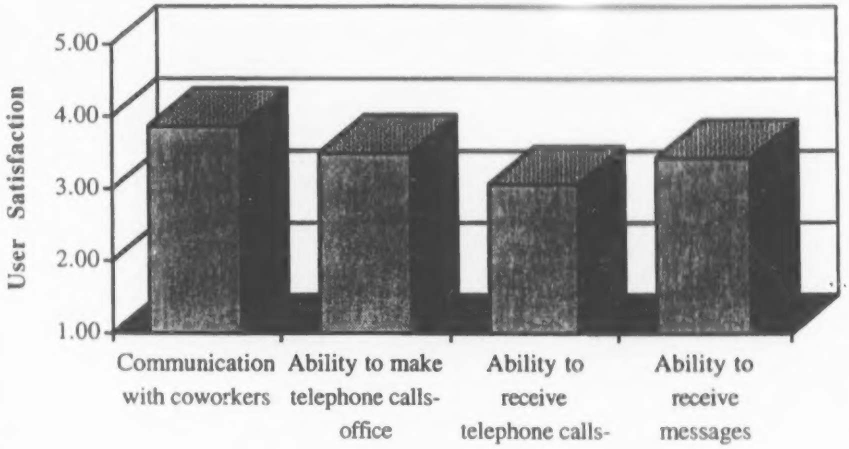


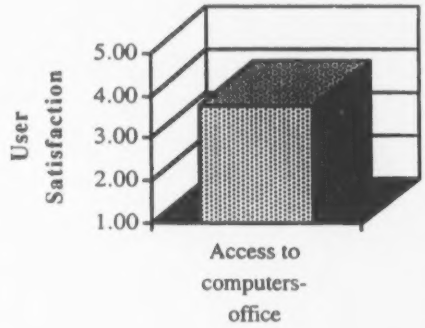
Figure 129: Communication Index

Communication issues were rated, on average, the same to slightly better than in the previous environment, with an average index of 3.47. Users rated issues related to the telephones (e.g., ability to receive telephone calls and messages) as lower than other communication issues (see Figure 129: Communication Index). One explanation for these lower scores is the fact that the mobile telephones were fairly problematic when they were first installed. Users had a difficult time discerning which mobile telephone was ringing when a call came into the office. Lights were added to the telephones to help users, but this modification was not added until after users had been working in the office for some time.

Technology Issues

As mentioned earlier, users of the free-address office were not asked about issues related to working at home. The only issue regarding technology was, therefore, access to computers in the office.

Figure 130: Technology Index



User satisfaction with this issue was rated better than in the previous environment, with an average index of 3.75 (see Figure 130: Technology Index). Users were given access to laptop computers that could access the mainframe. They therefore had access to technology from any location in the office.

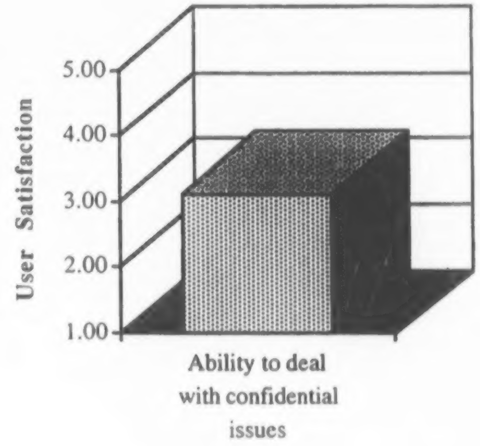
Home Issues

Users were not asked about their satisfaction with working at home. One reason that this section was not included on the Shimizu survey has to do with the culture of the Japanese office. Employees very rarely worked at home during the time that this office system was implemented, as is the case today (but to a lesser degree). Working at home was seen as "dishonorable" both to the employee and his/her family.[17]

Privacy Issues

The only issue in the survey with regards to privacy was the ability to deal with confidential issues in the office. This issue was not among the ten most important issues, but is examined here to clarify the impact of the office on privacy.

Figure 131: Privacy Index



Users rated their ability to deal with confidential issues in the new office about the same as in the previous environment, with an average mean of 3.12 (see Figure 131: Privacy Index). Users lacked private offices in both the new and previous environments to carry out confidential matters. The addition of more "quiet areas" or enclosed cubicles in the new environment accounts for the slight increase in satisfaction.

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[17] For more information on cultural differences, please refer to:

Becker, F., Quinn, K.L., Rappaport, A.J., & Sims, W.R., (1993) New working practices: Benchmarking flexible scheduling, staffing, and work location in an international context. New York: Cornell University International Workplace Studies Program, College of Human Ecology.

Becker, F., Rappaport, A.J., Quinn, K.L., & Sims, W.R. (1993). Telework centers: An evaluation of the North American and Japanese experience. New York: Cornell University International Workplace Studies Program, College of Human Ecology.

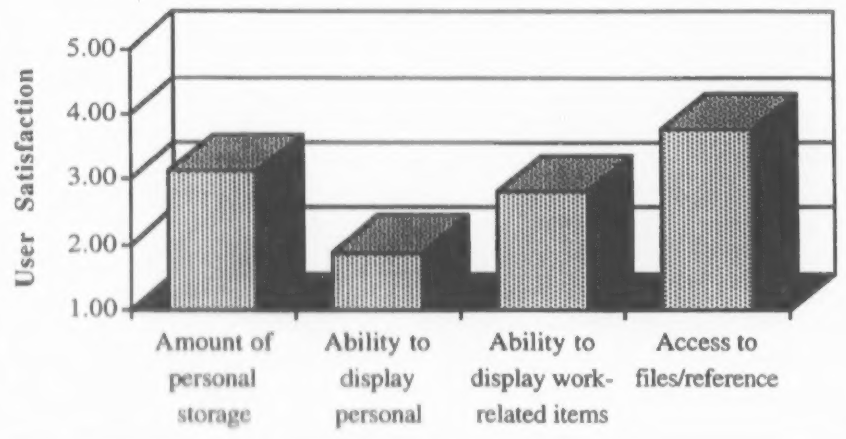
Storage/Personalization Issues

Ease of access to files and reference materials was the issue among the ten most important to fall under the heading of storage and personalization. Amount of personal storage, ability to display personal items, and ability to display work-related items were also added to the storage and personalization index.

User satisfaction with storage and personalization was quite varied (see Figure 132: Storage/Personalization Index). The amount of personal storage and access to files and reference materials were both rated the same to slightly better in the new environment. These scores were attributed to the mobile pedestals assigned to each user. Users could bring their files with them to their desired workstation. The amount of storage provided in these mobile pedestals was similar to what users had before the free-address office was implemented.

The ability to display personal items was rated substantially *lower* in the new environment. The users were moving from assigned workstations where they could personalize to unassigned workstations where they could not personalize. This low score, therefore, was typical of what occurs in many offices when non-territorial offices are implemented. The importance with regards to personalization, however, was rated the lowest of all the survey issues, with a mean score of 1.88.

Figure 132: Storage/Personalization Index



Alternative Space/Design Issues

One of the weaknesses of the earlier Workplace Survey is that it did not ask questions related to the office design. We, therefore, were not able to provided survey data for these issues. Interviews indicated, however, that, in addition to having more space and more flexibility within the office as a result of the various workstations, the design of the new office facilitated different types of working, such as conferences, informal meetings, and team work.

Overall User Satisfaction with Shimizu's Free-Address Office and The Implementation Process

The major goal of the free-address project at Shimizu was to improve the overall atmosphere of the office. Employees worked in open plans before the implementation, but not in a non-territorial fashion. By moving to a non-territorial office, the organization provided users with a variety of workspaces (e.g., quiet areas for more concentrative work, larger workstations for team work or work requiring extra space, etc.), as well as flexibility in the office for employees.

Unfortunately, however, the project was not successful across all of the implementations. The first implementation of free-address in the Planning and Engineering was fairly well received. The next two implementations, however, were essentially rejected by the employees. The Construction and Structural Engineering Departments reverted to their previous assigned office system gradually after free-address was introduced. Both of these offices were no longer operating in a non-territorial environment at the time of this study. A review of the implementation processes for each of the projects highlights some of the differences between the first and later two implementations:

- Ownership of the project decreased as the project moved into the second and third installations.
- The data collection became less intensive over time. The period of time dedicated to data collection went from one year in the first implementation to one week in the second and third projects.
- The method by which users were informed of the project changed in the later two implementations. In the first implementation, informa-

Figure 133: The Planning Process for Shimizu Across All Implementations

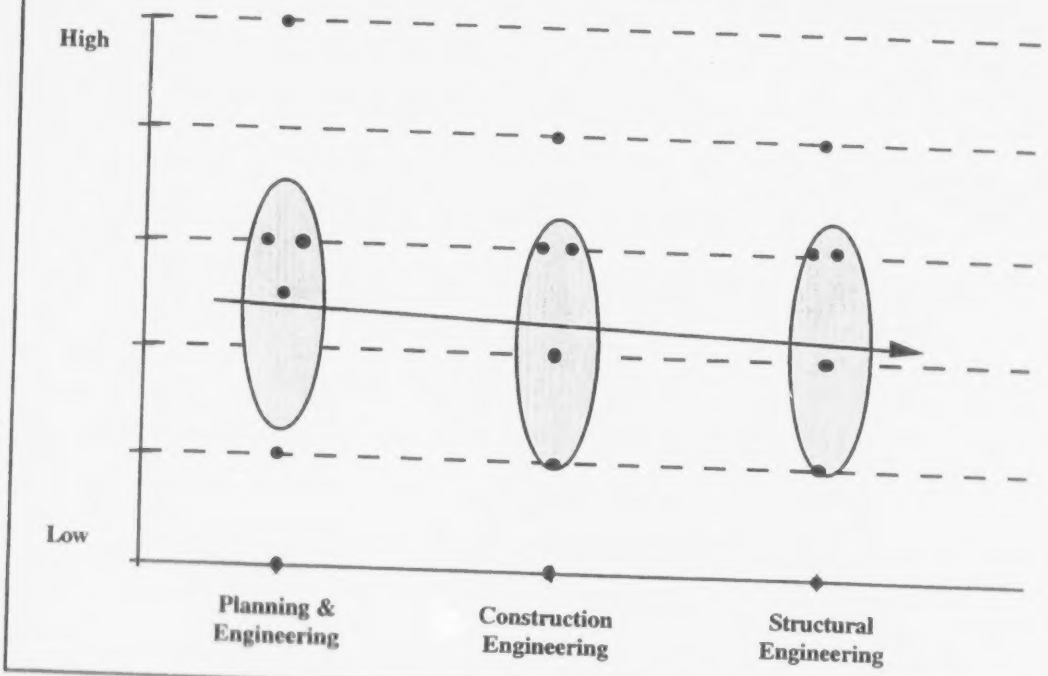


Figure 134: The Technology for Shimizu Across All Implementations

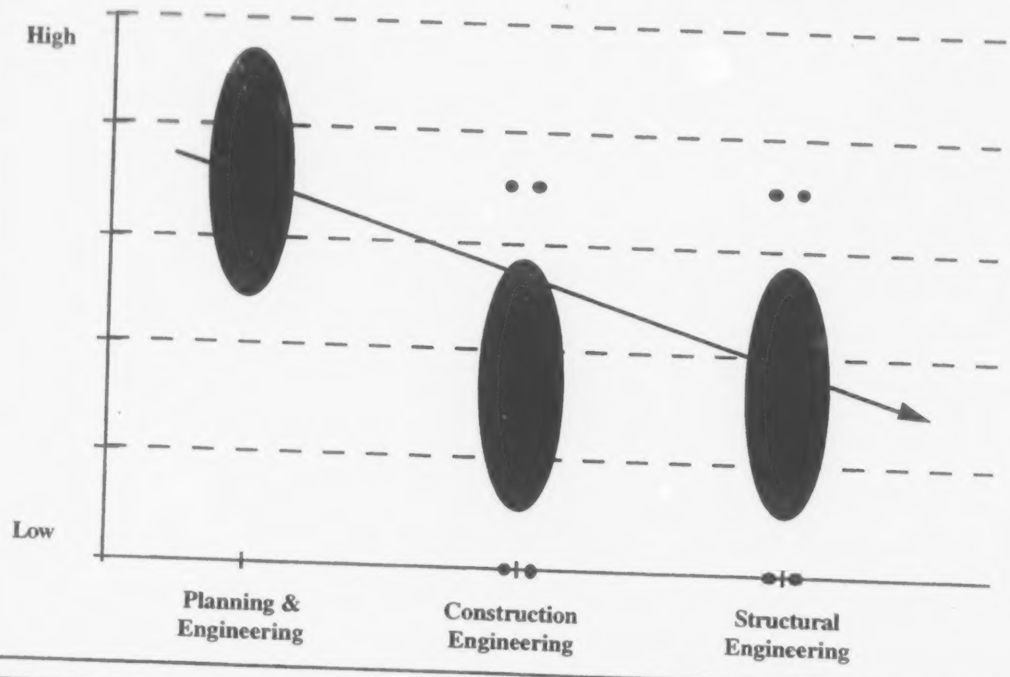


Figure 135: The Design for Shimizu Across All Implementations

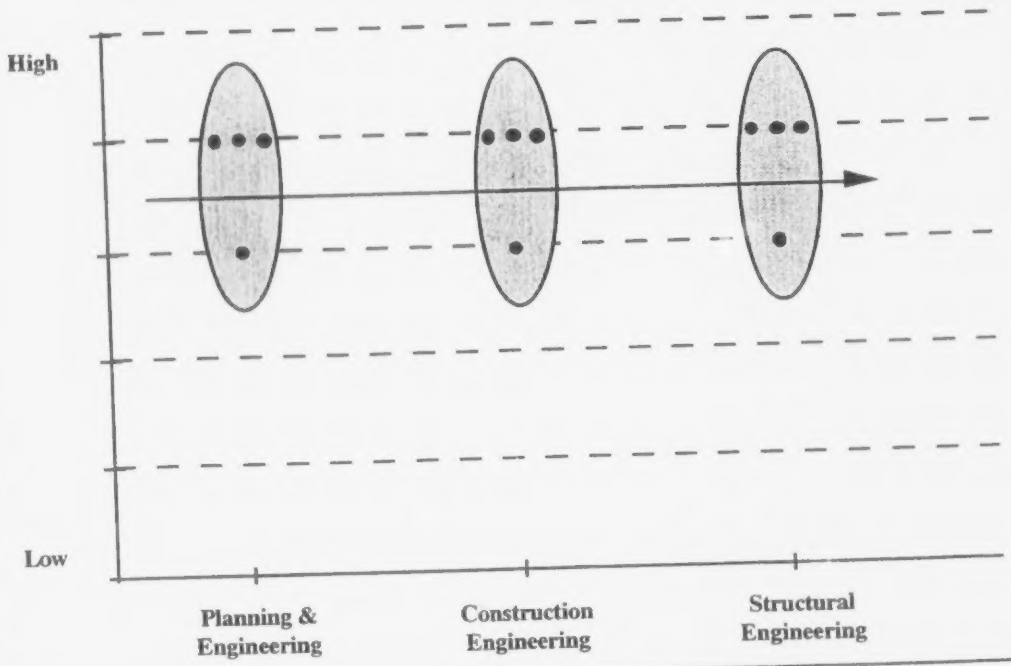
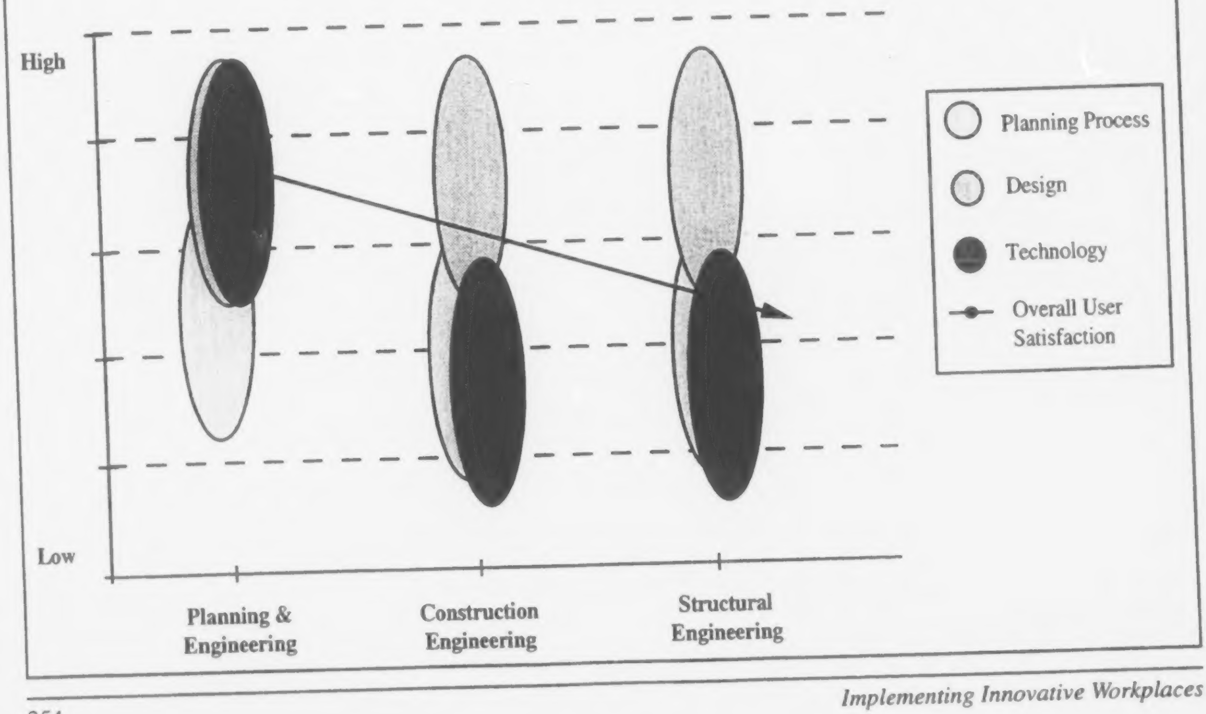


Figure 136: Planning, Design, and Technology for Shimizu Across All Implementations



tion began filtering to employees two months before the implementation, whereas users were not informed of the second and third installations until very near the time of implementation.

- The design of the free-address offices changed very little from project to project. Some minor modifications were made to the design of the later installations (e.g., the rounded end tables were added to create a conference area, more individual task lighting was added, etc.), some of which were added to the first implementation.
- The technology became "less mobile" in the later implementations. The original technology supported a flexible, non-territorial office, while the technology in succeeding projects became more traditional, supporting "owned" workspace rather than non-territorial.

The Free-Address Implementation Process

Using the IWSP rating system (see *IWSP's Rating System for the Implementation Process* in the IBM, UK section), the planning, design, and technology aspects were scored an plotted. The design did not change dramatically from project to project, while the emphasis placed on the planning and technology of the offices decreased over time.

While we did not have specific data on the user satisfaction in the second and third implementations, it was assumed that this satisfaction was lower than that of the first implementation since the lifetimes of both projects was fairly short. Overlaying the three components and assuming a downward trend in overall user satisfaction indicated that the user satisfaction followed the trends for technology and planning in the office; a downward trend over time. Some explanations for the decrease in satisfaction and failure of the second and third implementations could be:

- The end users had very little involvement and influence on the project in the later implementations. The Planning Department handled most of the design and technology issues, while the users of the system were only able to influence minor components. As a result, the users did not have a chance to "buy in" to the concept.
- Users were not aware of how the free-address office would affect them until shortly before the project was implemented. Without the user support, the later two implementations were not self-sustaining, and users returned to their previous way of working.
- Users were either not aware of how the office should operate, or

chose to ignore the non-territorial component of the free-address concept. Users in all three departments mentioned that employees were not changing workstations, but tended to work in the same place each day. By not participating in the free-address concept, users did not take advantage of all of the benefits of the system, such as flexibility and a variety of workstations for different types of work. Not seeing these advantages, users may have felt threatened that they would not have a workstation when they came into the office.

- Lack of support for flexible working, both by management and by technology, may have led to the second and third implementations reverting to their previous office system. Without the guidance and encouragement of management and the proper technology, it was very easy for users to continue with their old work behaviors.

Lessons Learned

Lessons learned from studying the non-territorial offices at Shimizu included:

- Similar to the shared-assigned offices at Ernst & Young, organizational learning occurred across the independent projects. Again, part of the reason this organizational learning took place was because people involved in the first implementation were also involved in the second and third.

- Ownership of the project is very important to the success of the project. The second two implementations of free-address at Shimizu had very little departmental ownership, and ultimately failed. While not all of the failure was a result of lack of ownership, it appeared to be a major contributing factor. It is possible that user needs/expectations were different in the subsequent departments, as well as management practices and policies, and that these were not understood without the departments having ownership of the project.

- Without a strong champion of the system, not just in the organization, but in the individual departments, it became very easy for users to neglect changing their work behaviors. While the manager of the Planning Department was a strong proponent of free-address, this same type of figure did not exist in the Structural and Construction Engineering Departments.

- End user involvement and understanding/support of the system is very important to the success of the project. A strong champion of the concept is also important, but ultimately the users need to support the project in order for it to be self-sustaining.

- In addition to gaining the support and understanding of current employees, it is also important to teach new employees about how the office system operates. Interviews suggested that new employees were not given explanations of the free-address office by either managers or coworkers, and therefore, worked in a traditional manner. In order for the office concept to continue and improve, all users—both new and old— must receive training about the new office concepts and how to work effectively in them.

Conclusion

We discuss below each of the specific research questions identified at the onset of the ***Innovative Workplaces*** study with reference to Shimizu and free-address offices. Later these questions will be discussed in more detail, with reference to all the organizations studied.

- *What factors (e.g., planning and design process, nature of technology, the design of the setting) tend to change the most as projects evolve?*

The planning and technology appear to have changed the most across the implementations. The planning process became less user-intensive, the project had less departmental ownership, and the technology became less mobile over time. The design, on the other hand, tended to stay relatively the same, with some minor improvements across the projects.

- *What aspects of the new workplace system tend to become standardized or uniform?*

All aspects of the second and third implementations were virtually identical. It would appear, then, that the entire implementation process became more standardized over time. One explanation for this is that the project was a solution-oriented strategy; the planners went into the second and third implementations with a standard solution as their starting point.

- *As organizations expand their implementation of new workplace strategies (within or across sites) does employee response tend to improve, remain the same, decline, or is there no consistent pattern at all?*

User satisfaction declined as the project expanded. As mentioned above, we were not able to obtain specific survey data on user satisfaction in the

Structural and Construction Departments because the departments were no longer operating in a non-territorial fashion. We could assume, however, that satisfaction decreased because the free-address offices no longer existed.

- *What differences are there in terms of cost and employee response (satisfaction, work effectiveness) as a function of whether the workplace system is primarily cost-driven versus business-driven ?*

The business-driven projects had a distinctly different focus than the cost-driven projects; the major emphasis was on improving the efficiency of the office. Different features were added to the environment that may not have been otherwise if the project had been primarily cost-based.

- *What are the organizational implications of solution-oriented vs. process-oriented workplace systems?*

It appears that, for Shimizu, the organizational impacts of a solution-oriented workplace strategy resulted in a standardization of the solution; each of the three offices looked and operated in virtually the same manner. As a solution-oriented strategy, it was easy for planners to standardize the implementation process since they already have an office solution designed. Standardization, however, tended to make the office solution more removed from the employees; the office concept was not necessarily to their liking, nor did it support their work patterns.

- *How does the implementation process change as the project moves from the pilot stage to widespread implementation? Is it necessary to focus as much attention on all three factors (design, technology, and planning process) in second and third installations to ensure similar success patterns as those achieved in the pilot project?*

As mentioned above, the projects tended to have a standardized solution, and thus, less emphasis on the implementation process. Without focusing as much attention on all three factors of the implementation process, the users were less receptive to the new office concept, which eventually led to the failure of the projects.

- *What is the nature of organizational learning that occurs as a function of whether the workplace system is process- vs. solution-driven, cost- vs. business-driven, or part of a strategic initiative versus an independent initiative?*

To some degree, organizational learning occurred at Shimizu. Certain factors, especially in terms of design, were found to be more efficient in the later implementations. These changes were then implemented in the earlier project. Our prediction was that this type of learning would be more prevalent in strategic rather than independent initiatives. The fact that the same people were involved in all three implementations strongly influenced the organizational learning.

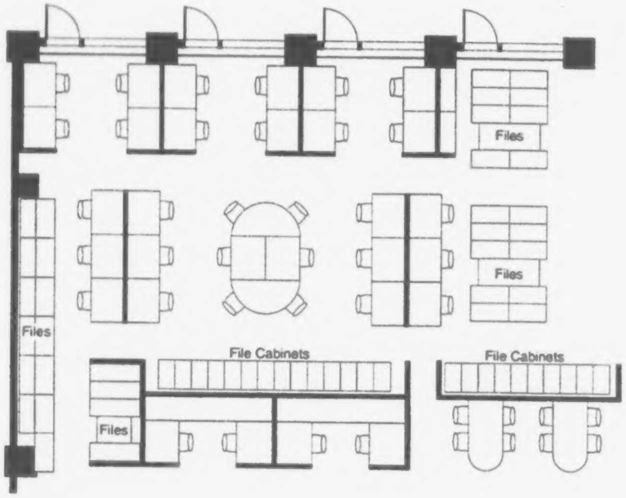

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Figure 137: Shimizu Planning Engineering Department Floorplan

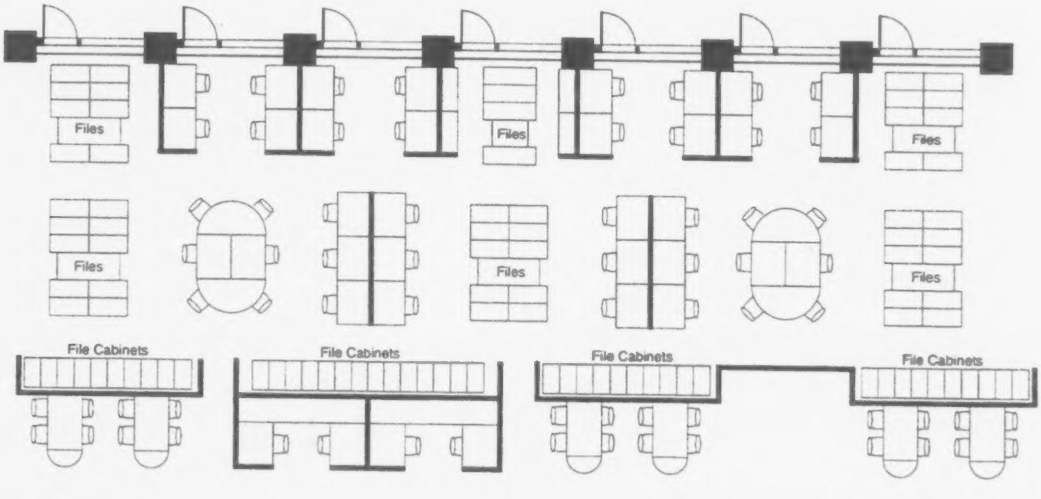
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Figure 138: Shimizu Construction Engineering Department Floorplan

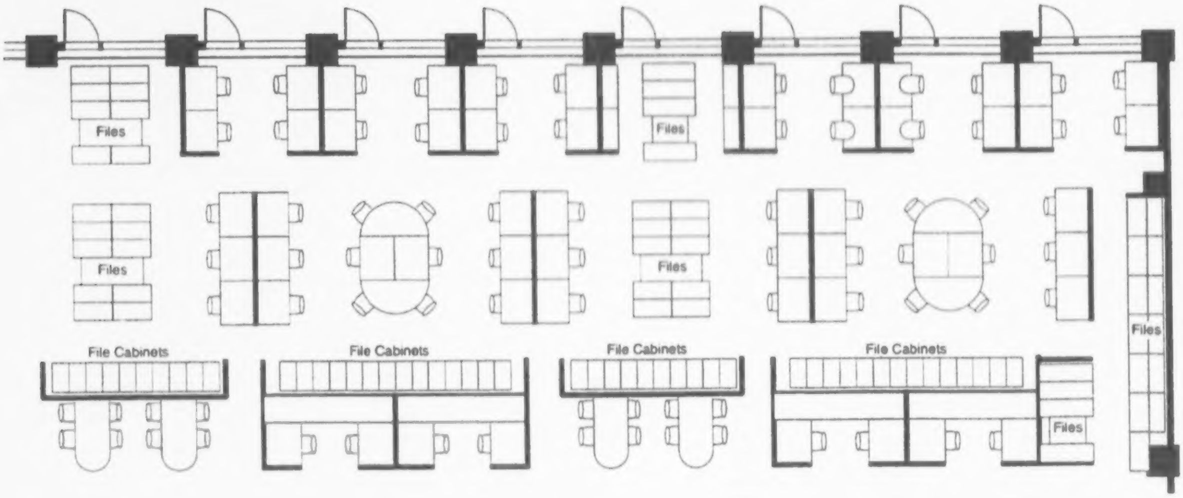
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Figure 139: Shimizu Structural Engineering Department Floorplan

Appendix A: Detailed Workplace Strategy Site Descriptions—IBM, United Kingdom

Glasgow

Location:	Glasgow
Number of Users:	62 users
Date Implemented:	October 1990
Job Types:	Field Sales

Background

Glasgow was one of the first implementations of SMART in IBM, United Kingdom. The planning for the project began in 1989, with actual implementation commencing in 1990. This field sales group agreed to participate in the SMART project when they were faced with the choice of either staying in their current location in the center of the city (and implementing SMART), or moving to a suburban site several miles outside of the city.

Implementation Process

The Glasgow pilot implementation, like all of the SMART implementations with the exception of Warwick I, was directed by the SMART team. The SMART team presented the concept to the managers and user representatives and then helped the group to implement the concept. A user representative team was established at the beginning of the implementation project. Although the types of workstations and the ratios for SMART users had already been established through the studies conducted by the SMART team and the outside consultant (see *The Development of the SMART Concept* section), the representative team was able to influence the layout of the office. The purpose of the user representative team was also to bring information back to the other users.

The number of users involved in this installation was fairly small compared to some of the later installations. Users were also all from the same department, with the same business objective. Communication, therefore, between the SMART team, the representative team, and the other users was fairly easy. Users had a strong sense of ownership of the project that might not have been possible had the numbers been larger.

Design

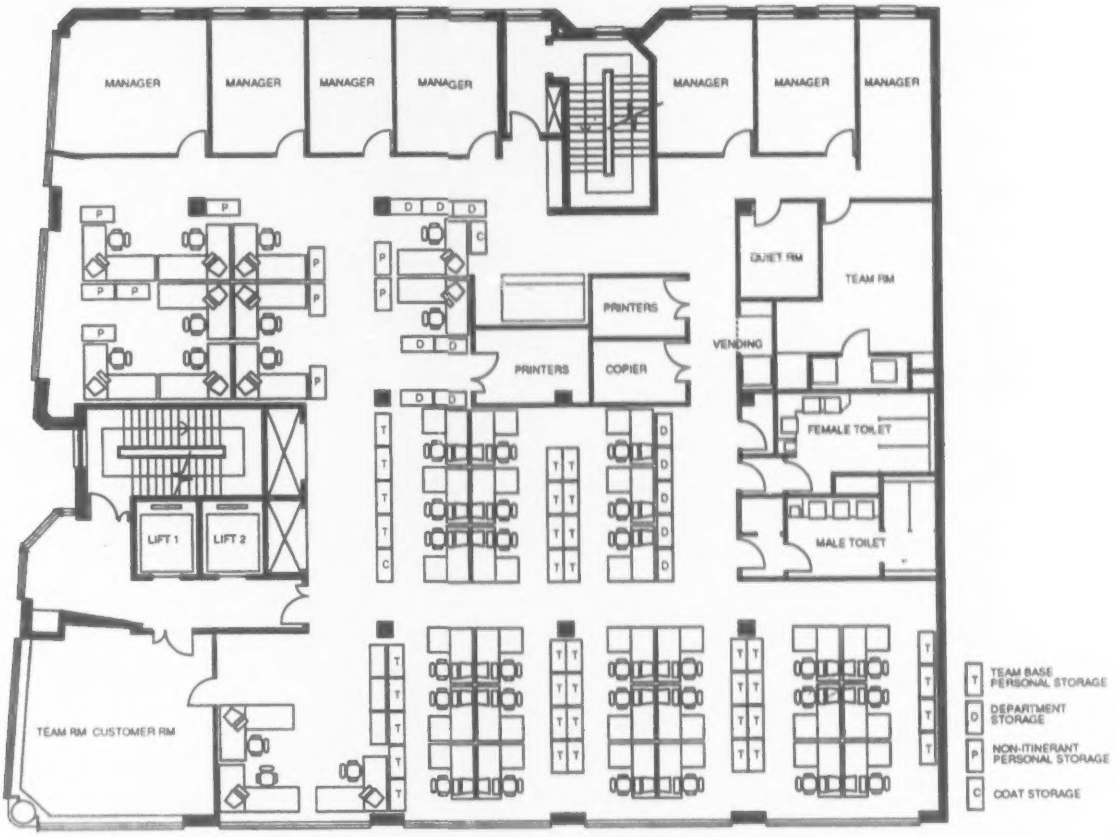
The non-territorial office was implemented in an existing office space that IBM had occupied for several years. The final design of the office was similar to that before SMART was implemented, the primary difference being that the workstations were no longer assigned.

Workstations

Both SMART and location-based (static) users had the same type of workstation; a primary L-shaped workstation with a desk, chair, computer, and a telephone. The workstations were surrounded on two sides by medium-height paneling.

Again, these workstations were the same workstations the Glasgow users had before SMART was introduced, but now SMART user workstations were unassigned.

The office area had seven manager offices. Managers were not "SMART;" they did not give up their office space with the implementation of SMART. Several of the unoccupied manager offices, however, were converted to "Visiting Manager" offices.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QUIET RM
TEAM RM
PRINTERS
VENDING
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COPIER
FEMALE TOILET
MALE TOILET
LIFT 1
LIFT 2
TEAM RM CUSTOMER RM
T TEAM BASE PERSONAL STORAGE
D DEPARTMENT STORAGE
P NON-ITINERANT PERSONAL STORAGE
C COAT STORAGE

Figure 140: Floorplan of IBM Glasgow

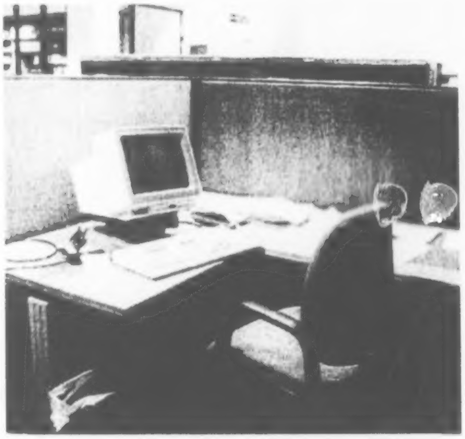

Photo 42: IBM Glasgow Workstation

Photo 43: IBM Glasgow Manager's Office

Photo 44: IBM Glasgow Team Room

Photo 45: IBM Glasgow Workstation with Various Technological Components

The office area had a large customer room that was also used as a team meeting room. In addition, the area had a designated team room and a quiet room. These two rooms could be used by either individuals or teams needing additional and/or quiet areas to work.

Storage

Storage at Glasgow was divided into four primary types: departmental storage, team storage, personal storage, and coat storage. The team storage, personal storage, and coat storage cabinets were identical from the outside (coat storage had the inside shelving removed). These cabinets were approximately five feet in height with a roll top. Departmental storage cabinets were large, floor-to-ceiling circulating central storage cabinets.

Technology

Office Technology

With the introduction of SMART, users were given more PS/2s to work with in the office than they had previously. Office technology included PS/2s or NPT terminals on all of the workstations. Users also had access to printers, fax machines, and modems.

Telephones

Glasgow used the existing telephone system to handle all telephone calls. All calls came into a main reception. The receptionist checked the user's log to determine his/her work location at the time, and then transferred the call to the appropriate workstation. Users were required updated their location through electronic diaries.

Additional Technology

Additional technology at Glasgow included customer site terminals, personal home technology, and car telephones, but this equipment was not issued as a part of the SMART technology package.

South Bank CP&S

Location: London, England
Number of Users: 25 users
Date Implemented: November 1990
Job Types: Consulting

Background

South Bank, like Glasgow, was one of the first pilot implementations of SMART in the United Kingdom. The system consultants in CP&S agreed to participate in the SMART project with the understanding that they would all be issued new personal computers at home. This implementation involved one of the smallest groups, only 25 people, of all of the SMART installations.

Implementation Process

The implementation process at South Bank CP&S followed the same pattern as that at Glasgow. The SMART team presented the concept of SMART to the department and then guided the implementation process. A user representative team was formed to help in the layout of the office. Again, because the small size of the CP&S group, communication between the SMART team, user representatives, and other users was fairly easy and users had a strong sense of ownership of the project.

Workstation ratios, participating job types, and the design of the workstations were derived from the earlier studies conducted by the outside consulting firm and the SMART team.

Design

The SMART installation at South Bank was again limited to the existing facility. The 25 SMART participants were grouped in a single section amidst static users.

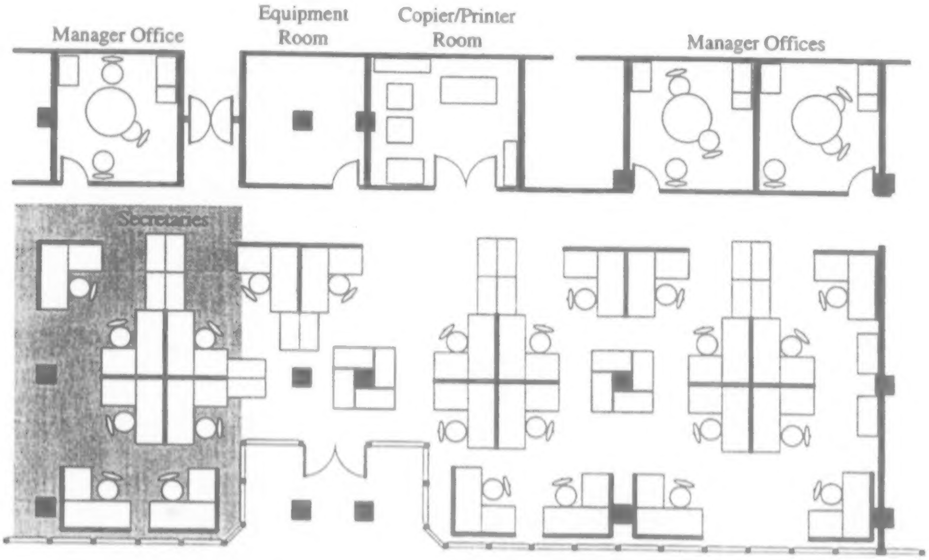

Figure 141: Floorplan of IBM South Bank

Workstations

The workstations were the same workstations that users had before implementation: an L-shaped workstation with either a PS/2 or an NPT terminal, chair, and telephone.

Managers continued to occupy enclosed offices. These offices could be used by others for informal meetings or team projects when they were unoccupied.

No additional work areas were provided (i.e., project rooms, quiet rooms, conference rooms, break out areas, etc.).

Storage

The storage facilities were similar to those provided at Glasgow with the exceptions that the storage cabinets had double doors rather than roll-tops, and the shelves were modified slightly to accommodate file boxes that could be carried to the workstations.

Technology

The technology provided at South Bank was identical to that at Glasgow; more PS/2s were supplied to the users. A PS/2 or NPT terminal was at each workstation. All calls came to main reception. The receptionist would then check the user diaries to determine which workstation calls should be transferred to. Users were responsible for updating their user diaries. The primary difference in technology between the two installations is that South Bank users were issued new home computers (PS/2s) with which they could link up to the network from home.

Photo 46: IBM South Bank CP&S Workstation

Photo 47: IBM South Bank CP&S Storage

Warwick I

Location: Warwick, England
Number of Users: 26 users
Date Implemented: June 1991
Job Types: Consulting

Background

The SMART implementation at Warwick in 1991, referred to as Warwick I for the purpose of this report, is a very interesting case in that it was the only SMART site that was not formally approached by the SMART team and was not formally slated to participate in SMART. The Services group was expanding and was facing eminent relocation because of their increasing size. The users had heard about SMART and decided to implement the concept in their office. Warwick I users had the benefit of the workstation ratios established in the earlier studies, but they did not have the support of some of the other aspects of SMART, such as the technology package (PS/2s in the office and/or at home) and the design considerations (quiet rooms, break areas, etc.).

Implementation Process

Since the users initiated the implementation of SMART, they were therefore naturally were very actively involved in the planning and design of the project. The SMART team essentially acted as consultants, but the majority of the project was carried out by the actual users.

Design

The Warwick I users designed the project around the existing facility and furniture. In essence, the only change to the office was that desks were shared at a 2:1 ratio. The workstations were the standard IBM L-shaped workstations with a terminal, chair, and telephone.

Technology

Computers

Warwick I did not have additional PS/2s supplied to the users as a result of implementing SMART. It is unclear whether they had some PS/2s in the office already (which is likely), but no additional ones were supplied. No PS/2s were given to the employees to take home as a result of SMART as they were at South Bank.

Beyond the technology located in the office, the Warwick I installation introduced a very important technology component to the SMART concept that became standard in many of the later installations: portable technology. Users were issued a portable computer that could be used in the office or at home, called the "luggable" computer by the users. This technology was fairly heavy and inconvenient compared to the newer, lighter laptops, but it added a new dimension to SMART that was not evident before this implementation. The addition of the portable technology brought to surface the notion that work did not have to occur just in the office, but, given the proper technology, could be performed in any location.

Telephones

Warwick I users developed their own telephone solution unique to any of the other installations. Because their desks were shared (and the people were therefore fairly consistent in where they worked), the users simply placed two telephones on each of the workstations. Calls came directly to the workstations without having to go through main reception. This deviation from the typical telephone solution was due in large part to the fact that Warwick I was not officially part of the SMART program.

When the second implementation of SMART occurred at the Warwick location, the first SMART pilot project was absorbed into the larger implementation. As a result, users were given the new SMART technology package. The new technology included:

- laptop computers to replace the luggables
- portable printers for use out of the office
- higher ratio of PS/2s in the office
- a new telephone system with a direct dial number (see Warwick II case study for more details).

South Bank City of London

Location: London, England
Number of Users: 66 users
Date Implemented: February 1992
Job Types: Consulting and Sales

Background

The City of London group was transferred from the IBM Basinghall location to the South Bank location. Most of their clients were in the City of London financial district, and were within twenty minutes of South Bank. At the time that they moved into the building, the earlier South Bank SMART users had been moved to Downstream. This made the City of London users the only SMART users in the entire building.

The South Bank building was a very popular location for many IBM employees. As mentioned above, it was near the financial district of London and had a fairly central location to many IBM clients. The executive offices for IBM were also located in this building, causing a heavy traffic of people through the building.

The City of London group was approached by the Country SMART Program to participate as a pilot for the South Bank building. At the time of implementation, the department had a very strong champion (the Branch Manager) of the SMART concept that was instrumental in getting his people to accept the project. Shortly after the project was implemented, this manager left without being replaced by another strong SMART advocate.

Implementation Process

As mentioned above, the City of London group was approached by the Country SMART Program to act as a pilot group for South Bank. The Branch Manager liked the concept and agreed to participate. Three primary teams were established to help plan and design the project: a project team, a technical team, and a user group. The Project Team had primarily SMART team people on it (SMART project coordinator and technical advisors). The City of London group had limited control over the planning of the project in that the ratios of desks to people had already been set by the SMART team, as well as the budget for the project: the budget was to remain the same, and any savings associated with SMART were to be applied towards technology. They were, however, instrumental in scheduling the best and most appropriate means of implementing the project in their area.

The Technical Team was a combination of the technical advisors from the Project Team (SMART team people) and City of London technical people. The User Group was made up from 6-8 City of London sales people. This group was presented with the progress/developments of the other two teams and asked for their feedback.

All users were informed of the progress of the project through monthly newsletters issued by the Branch Manager. Approximately four of these newsletters came out before the actual move-in date.

Design

Group Area

Upon entering the SMART area of South Bank, people encountered signs indicating that it was a department SMART area, how it was to be used, and where visitors could work. A whiteboard was also present to indicate where employees could be found in the area at any given time.

Workstations

Forty workstations and nine offices were allocated for use by sixty-six people (five managers and 61 staff). The workstations were the standard IBM L-shaped primary workstation with computer, desk, chair, and telephone. The managers were not SMART users in that they did not give up their personal space. Of the nine offices, however, four were unoccupied. These offices were used for visiting managers, quiet rooms, and work rooms as needed.

Upon initial move-in, City of London had provided no drop-in or visitor workstations. Shortly after moving into the area, this type of workstation was deemed necessary to handle the additional people coming into the department (but not necessarily belonging to the department). Two primary workstations were sacrificed to make eight visitor or drop-in workstations, each with a single table, telephone, and NPT terminal. No compensation was made, however, to accommodate for the two workstations that had been taken away. Users found that they were often forced to use the drop-in areas for long-term work when the office was crowded, and found this space to be inadequate. The drop-in areas were then reduced to four, the other four being converted back into a primary workstation.

Two conference rooms were supplied specifically for the department.

Storage

The storage cabinets at City of London was identical to that of the original South Bank implementation: five foot storage cabinets for team, personal and coat storage, with a large, horizontal circulating storage cabinet for departmental storage. Static workstations (approximately 6-8) were supplied with pedestal storage bin.

Technology

Computers

The technology package for City of London was a combination of what had been given at the previous SMART installations. The office received more PS/2s for in-office use. Workstations were equipped with either an NPT or PS/2, with a larger number of PS/2s (60%).

Ten laptop computers, lighter and more efficient than the luggable computers at Warwick I, were issued to the department. Users could schedule the use for these laptops by signing them out on a logging system. Unlike at any of the previous SMART sites, docking stations that allowed laptop users to link and download to the network were installed at some of the workstations.

Although not all users were issued home technology, five PS/2s were given to the department for certain users to take home.

Telephones

City of London used the existing telephone system to handle all their calls. Calls came in through main reception and were then transferred to the workstations by checking the electronic diary to see what extension users were working at.

Later, after the installation of the new telephone system at Bedfont (see Bedfont Lakes case study for more details), a new telephone system was added using a direct dial number.

Additional Technology

In addition to the pooled laptops, City of London users also had access to two pooled portable telephones. Although users at other locations often had access to portable telephones, this is the first example of such technology being part of the SMART package.

Bedfont Lakes

Location:	Outside London, England near Heathrow
Number of Users:	500+ users
Date Implemented:	August 1992
Job Type(s):	Sales, Marketing, Systems Engineering

Background

Bedfont Lakes was the first large scale implementation of SMART at IBM in the United Kingdom. Over 500 users were introduced to the SMART concept in this installation from three primary job types: sales, marketing, and systems engineering. The creation of the Bedfont Lakes facility enabled IBM to close three of their previous buildings (Brentford, Richmond, and Chiswick) and house these users at a single site. Without SMART or some other form of alternative office environment, this consolidation would not have been possible: 1,000 users were able to occupy a building that under traditional office space allocation would have housed only 600.[18]

Bedfont Lakes was also the first building that IBM was able to design around the SMART concept, rather than implementing in an already existing facility.

Implementation Process

Unlike at many of the earlier SMART installations, Bedfont Lakes had very little end-user involvement in the planning and design stage of the project. This site had the largest number of users compared to previous installations, all from a wide variety of businesses (departments). It was felt that it would be too costly and too difficult for a large number of users to participate in the developmental stage of the installation at Bedfont.

The majority of the planning and design of the project was handled by the Country SMART Program team in conjunction with representatives from Bedfont, such as Facilities Management, MIS, and human resources. This team then formed a user consultation group to convey any progress and important happenings to other users. This consultation group was compiled of future Bedfont Lakes managers that were one level below the Branch Managers. These managers were chosen over the Branch Managers because the SMART team felt that these people were more functional users and could relate both to manager and user issues. The number of managers involved in this group varied; from six managers in the beginning to twelve at its highest point, with any number in between at any given time. This variation was due mostly to reorganization/restructuring of IBM. Managers would leave or be transferred, and no manager would be appointed to replace them in the group.

In addition to information being brought to the users through the user consultation group members, information was also sent to users over the computer network. This information, however, was primarily updates on the construction progress, not how the space was going to be used.

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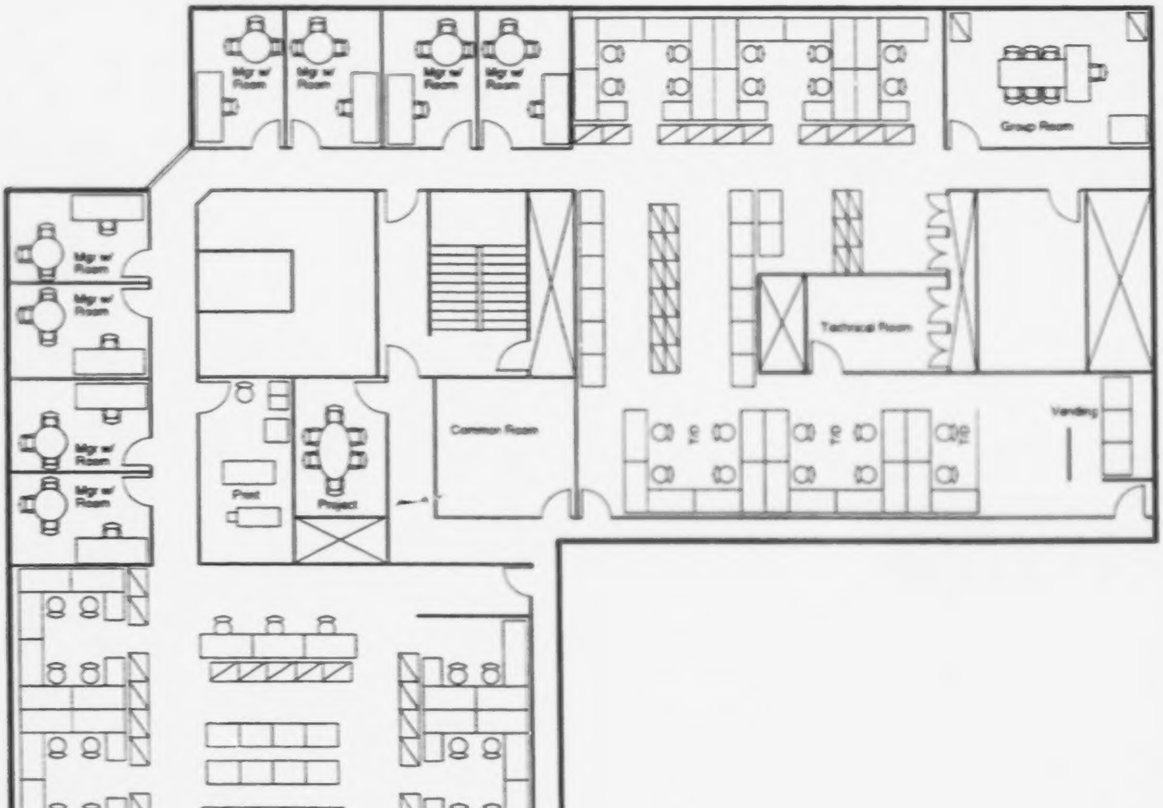
[18] (1992). £100 Million joint venture bears fruit. Corporate Members News.

Using the ratios established by the consulting firm in the overall IBM, UK survey, the SMART team determined which job types would be SMART and which would be static (location-based). Some of the users were told before moving into Bedfont that they would be "SMARTed," while others found out their status upon moving into the facility. Before moving into the new facility, all users were told that they would need to reduce their storage requirements before moving into the new facility.

Users were introduced to both the technology and the facility in a single-day training session. Users were walked through the facility and issued their technology (see *Technology* section for more details) if they were SMART employees. Users were also given guidelines to how the space was to be used by both static and SMART users.

Six months to a year after moving into the new building, an outside consultant was hired to collect individual occupancy data in some of the departments that were experiencing overcrowding to see if the original ratios used were appropriate and make adjustments as necessary.


Mgr w/ Room
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Mgr w/ Room
Group Room
Mgr w/ Room
Mgr w/ Room
Technical Room
Mgr w/ Room
Mgr w/ Room
Common Room
Vending
Print
Project

Figure 142: Floorplan of IBM Bedfont Lakes

Design

The Central Building

Bedfont Lakes is made up of three buildings owned by IBM. The central building houses the main reception, showcase areas, and the cafeteria, as well as officing. The central facility is the only building of the three that can be entered without a security badge. Upon entering the central facility, guests and visiting employees must register at main reception, where they are given a badge for the facility and directed to the proper areas. Visiting employees can work in a number of visitor areas specifically designated for such use.

All of the officing looks down into an atrium, the first floor of which contains both the cafeteria and the showcase facilities. The interior and exterior walls of the offices are primarily constructed of glass, allowing natural light to create an open, bright working environment.

Photo 48: IBM Bedfont Lakes Visitor Registration

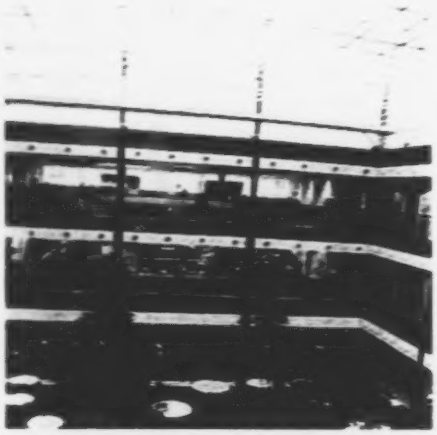

Photo 49: IBM Bedfont Lakes Atrium

Office Areas

As mentioned earlier, the Bedfont Lakes facility was designed with the notion that SMART would be used in this building. The designers were therefore able to include certain user spaces in the building that were not possible in many of the other installations, such as work rooms, quiet rooms, informal conference areas, etc. Bedfont Lakes was also designed in such a way that the space is universal; that is, the space is flexible to respond to change within the organization, either through churn or growth. Each of the different department areas were designed in the same manner with the same facilities and services available:

- Branch Managers located at Bedfont were given a large office with a conference table.
- Any support staff for the area, if any, were located near the Branch Manager's office.
- Static employees were given workstations near the windows.

- "SMART" employees could choose to work at any of the SMART workstations which were located along the interior walls.

- Each department area was equipped with a number of manager offices. Managers were originally slated to give up their personal space and use offices on an as-needed basis and availability. Many of the managers, however, "commandeered" offices for their own personal use.

- Each department area was allocated a number of quiet workrooms, similar in design to the manager offices, where employees could work on projects or more concentrative work without being disturbed by commotion from daily business activities.

- Each department area was allocated what was referred to as a "common room." These rooms were furnished with informal seating, magazine racks, and small tables to give employees the opportunity to conduct informal meetings away from the workstations. Many of the Branch Managers, however, have requested that these areas be converted to formal conference areas, stating that they are rarely used for their intended purpose.

Photo 50: IBM Bedfont Lakes Overall View of the Office

Photo 51: IBM Bedfont Lakes Primary Workstation

Workstations

Four primary workstations were incorporated in the design of the offices:

- Primary workstations consisted of an L-shaped desk with chair, terminal, and telephone. This type of workstation was available to both SMART and static employees. These workstations were surrounded by low-medium paneling on two sides to afford some privacy. They were intended for employees who had to perform tasks that required more than just a few hours.

- Quiet workrooms were enclosed offices that could be used by employees for more concentrative work.

- Touchdown areas were groups of terminals designed for short-term use. Touchdown areas were equipped with a terminal or communications cartridge to link laptop computers. This workstation was somewhat smaller than that of the primary workstation. Workers who were only going to be in the office for a short period of time could check their

Photo 52: IBM Bedfont Lakes Quiet Workroom

Photo 53: IBM Bedfont Lakes Touch-down Workstation

mail, update their electronic diaries, and complete other less time consuming tasks.

- Workrooms were essentially vacant manager offices that employees could use to work quietly on their own or in teams. If a manager office was unoccupied (either permanently or temporarily), employees were free to use these offices.

Storage

Bedfont Lakes implemented several different alternatives to storage than had been used in past projects. Floor-to-ceiling central storage cabinets were employed to replace the smaller mid-sized cabinets found at such places as Glasgow and South Bank. These cabinets were double-sided, single entry point units; users were able to store items on both the front and the back sides of the cabinets, while only accessing from one side. The user could rotate the shelves to the desired side by pressing a lever on the bottom of the stationary frame.

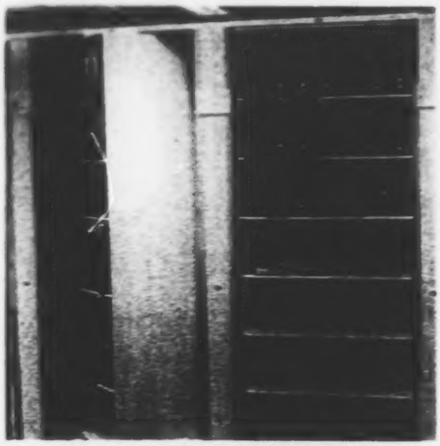

Photo 54: IBM Bedfont Lakes Large Storage Bins

Photo 55: IBM Bedfont Lakes New Cabinets with Portable File Box

Bedfont Lakes also employed a new personal storage cabinet designed specifically for this site. This storage unit was provided for personal storage at Bedfont, and was designed using specifications developed as a result of an IBM storage study. This study estimated that the actual storage requirements ought to be approximately 1.5 linear meters for most employees, with managers and some job types requiring additional space. The new storage units were designed accordingly.

A third form of storage provided to SMART employees was a small portable "black box" with shoulder strap designed to allow employees to carry several files with them from location to location. Static employees were issued a filing cabinet instead of this black box.

Technology

Computers

The technology package for all SMART users was a laptop with a modem and a printer. The technology package for within Bedfont followed two general rules, with some exceptions for special equipment needs: 1) permanent workstations were supplied with two PS/2s, two NPT terminals (dumb terminals), and one docking station (to link laptop computers to the network) per four workstation configuration; 2) SMART workstations were supplied with one PS/2, two NPT terminals, and two docking stations per four workstation configuration. The reasoning behind the two different packages is that SMART users have their own assigned laptops, and therefore need fewer PS/2s and more docking stations than location based workers.[19]

Telephones

IBM recently installed a new telephone system at most of their office locations in London, beginning with Bedfont Lakes. The new system employed the use of a Direct Dialing Inwards (DDI) number; employees were given a DDI that must be

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[19] Country SMART Programme 1993 Operating Plan Budget Submission, IBM.

Photo 56: IBM Bedfont Lakes SMART Workstation with Technology

logged into the telephone system at the workstation used by the employee. All calls to that employee are then routed directly to that line without having to go through main reception. The employee's telephone privileges (e.g., long distance authorization) are transferable to wherever the employee is working.

The new telephone system also allowed callers to leave a voice-mail message if the employee stepped away from the desk.

Electronic diary kept track of where employees were during the week. When the user logged onto the system at a site, the electronic diary was automatically updated to inform inquiring users of the person's location.

Additional Technology

Some users were given additional technology, such as a car telephone, fax machine, etc. This extra equipment, however, was not part of the SMART technology package. Users were issued this equipment because they were able to show a need for such technology (based on the number of hours employees use this type of equipment in a given week).

Warwick II

Location: Warwick, England
Number of Users: 470 users
Date Implemented: January 1993
Job Types: Consulting, Sales, Systems Engineering

Background

Almost two years after the first pilot project at Warwick was implemented (Warwick I), SMART was implemented across the entire Warwick location. This was the second largest installation of SMART in the UK, involving 470 users.

Implementation Process

As was the case with Bedfont Lakes, Warwick II users had very little input into the planning and design of the project. Property informed the managers that they had to reduce their space. The SMART team then presented the concept to the managers and guided the implementation. A small user representative group was formed to relay information back to the staff.

The SMART team used the ratios that were established in the earlier studies by the outside consultant as their standard. Departments were told that they would be given a certain amount of space, and for the space that they gave up, they would be issued a certain amount of technology. The departments could then run SMART in whatever manner they chose. For example, some managers chose to give up their office, allowing staff to use the office as a quiet room or work room, while others continued to have their own office. Some managers did not allow any personalization of the workstations, whereas other managers did not mind if the users personalized the SMART workstations.

Because of the large numbers involved in this implementation, there was not an overwhelming sense of ownership in the project.

Design

Office Area

Unlike at Bedfont where static and SMART employees were located in distinct areas, the SMART workstations at Warwick II were scattered in clusters throughout the facility. Maps were located at entrances to the different areas indicating where SMART clusters were located on the floor. The SMART team felt that this arrangement might help the feeling of isolation expressed in some of the other installations.

Workstations

The Warwick II site used all of the previous furniture and office space for the implementation of SMART. The workstations were the standard IBM L-shaped primary workstation with computer, telephone, desk, and chair. The majority of the workstations were surrounded on two sides by high panels.

A few touchdown stations were located in the different areas, but this arrangement was not consistent in each of the departments.

Photo 57: IBM Warwick II Primary Workstation

Photo 58: IBM Warwick II Visitor Workstation

No quiet rooms or workrooms were incorporated into the design because of the space constraints of the existing facility. Manager offices could be used for such purposes if they were unoccupied.

Visitor Areas

Four main visitor terminals are located in the facility. These terminals are located in a main hallway and are separated from the departments.

Some departments also have designated visitor workstations, but these workstations were primarily used by visitors specific to that department and were not meant for general use.

Storage

Warwick II users had access to the same storage cabinets that they had before implementation, the number of which,

Photo 59: IBM Warwick II Storage Facility

however, was reduced. before implementation, users had access to an entire floor-to-ceiling storage cabinet. After SMART was implemented, two people shared a single cabinet.

Technology

Computers

PS/2s were added to each of the departments using the ratios established for the Bedfont project (see *Technology* section in Bedfont case study). Workstations were equipped with either a PS/2 or an NPT, and docking stations for laptops were also provided.

All of the SMART users were given laptop computers. Most of the users were also given printers. Several groups had to pool their printers because there were not enough printers available to give everyone their own.

Additional Technology

Some of the employees had access to car telephones, fax machines and other equipment, but this equipment was not part of the SMART technology package.

Appendix B: Detailed Workplace Strategy Site Descriptions—Ernst & Young, London

Project 1: Management Consulting Services

Location:	London, England
Number of Users:	96 users
Date Implemented:	1988
Job Types:	Management Consulting

Background

The first implementation of a shared offices in MCS was in 1988. The Management Consulting Services division was responsible for developing and implementing information systems. Consultants in this department generally spent anywhere from 1 day per month to 3-4 days per week in the office. Management saw the opportunity to lower facility costs by converting the office to some form of shared officing since employees were not in the office a large portion of the day. Management decided to move towards a system where 3-4 people were assigned to a specific workstation. Typically, each of these groups included one senior consultant.

The number of employees involved in the first implementation totaled 96, with a desk/employee ratio of approximately 1:3. Senior consultants had priority over more junior consultants and could move them from a workstation. Consultants who were removed from a desk could then use any unoccupied station. Should, however, an owner of that workstation come into the office, the consultant would have to move again.

Implementation Process

Before the merger of the two accounting firms, consultants from one organization were working in enclosed offices, while the employees from the other firm were working in open offices. Management felt that to move to a true non-territorial office would be too much of a "culture shock" for the employees coming from enclosed offices. Shared-assigned offices were viewed as a compromise between private offices and non-territorial offices.

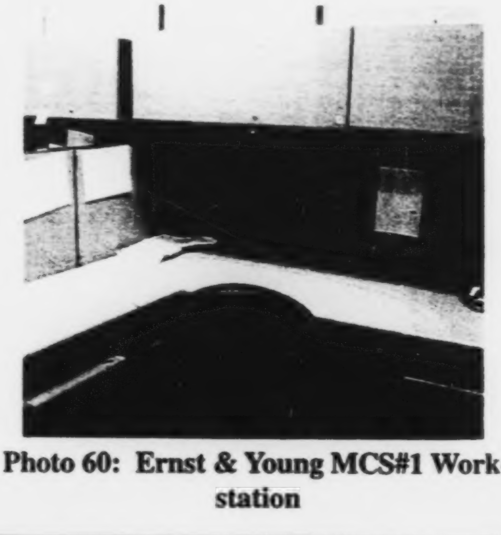

Photo 60: Ernst & Young MCS#1 Workstation

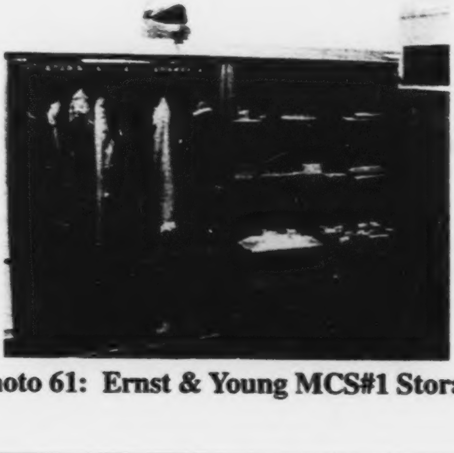

Photo 61: Ernst & Young MCS#1 Storage

All decisions regarding the project were made by the Director of Administration; staff had no influence over the planning or design process. Essentially, Facilities Management and the Director of Administration worked out an office system, and delivered a completed office to the employees.

Space, furniture, and office enclosure at Ernst & Young was very hierarchical: the higher in the organization an employee, the more space he/she received, the better the furniture, and the more private the office. Partners (the highest employees) were unwilling to participate in the shared office system. Each partner had a private 130 square foot enclosed office, which remained unchanged.

The other job titles present in the MCS department were: executive consultants, management consultants, senior consultants, consultants, and support. With the exception of support staff (who received a permanent workstation), all of the other employees were assigned a shared workstation.

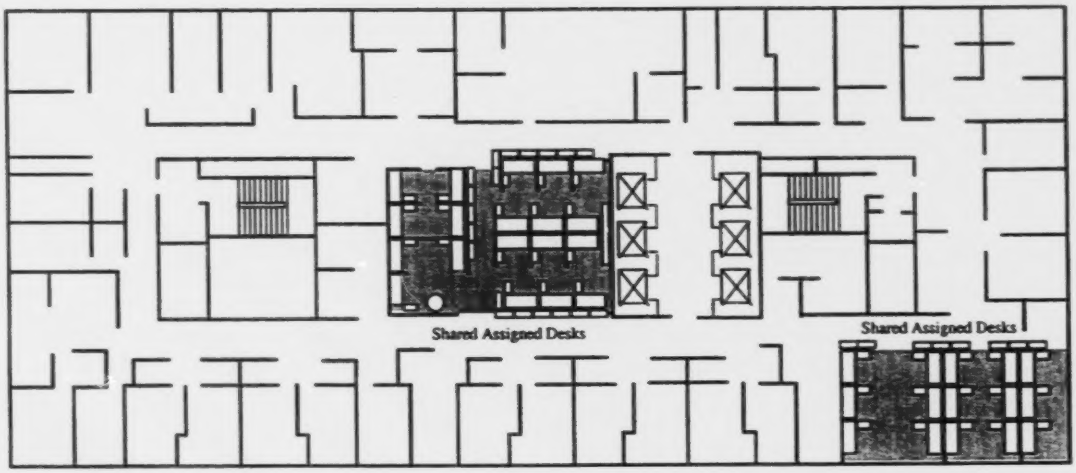

Figure 143: Floorplan of Ernst & Young MCS #1

Design

Office Area

The shared workstations were grouped into two areas on a single floor. Employees were not given additional space to work beyond the primary workstation. The reasoning behind this design was basically a cost and space issue; given the space allocated to the department, it was not possible to provide a variety of work spaces, conference rooms, project rooms, etc. Conference rooms/project rooms were located on a different floor in Becket House. Employees either moved to this other floor for meetings or they conducted conferences at the client sites.

Workstations

Thirty-four workstations were assigned to 96 users in MCS. The workstations consisted of an L-shaped desk surrounded by high paneling on two sides. The size of the workstation varied across job levels, with more space awarded to higher level consultants. Usually, more junior consultants were closer together, with high paneling on the back of the workstation and medium-height paneling separating the workstations.

Storage

In terms of storage, several different alternatives were put into practice for Project 1: floor-to-ceiling common storage, overhead workstation storage, personal file drawer storage, and mobile pedestals. The mobile pedestals provided were not intended to be moved from workstation to workstation by an individual employee. The pedestals were primarily to make the configuration of the workstation more flexible.

Technology

Computers

Almost all (approximately 85%[20]) of the workstations were provided with a PC, most of which were connected to the LAN. Although consultants were not given individual laptops, one could be signed-out on an as-needed basis from a pool of laptop computers.

Telephones

All workstations were also equipped with a telephone. All telephone calls went to a central reception number. The secretary would then transfer the call to the appropriate workstation. Employees were expected to report their work location to the secretary each day.

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[20] Ernst & Young. (1991, February). Ernst & Young MCS (UK) micro-computer strategy.

Project 2: Management Consulting Services

Location:	London, England
Number of Users:	298 users
Date Implemented:	1992
Job Types:	Management Consulting

Background

The second implementation of shared offices involved the same Marketing Consulting Services division, but on a much larger scale. Including support staff, 298 people were involved in this installation.

Before moving into the renovated space, MCS was scattered throughout two of Ernst & Young's buildings in London. The goals/drivers behind this second project included: increased productivity by consolidating all of MCS, and decreased facility costs through a reduction in space requirements.

Photo 62: Ernst & Young MCS#2 Overall Office Area

Implementation Process

One of the major differences between the first and second implementations of shared offices was that more resources were spent in the planning stages of the second project. MCS assumed ownership of the project from the very start of the project. In early 1992, MCS approached Facilities Management with a proposal to consolidate MCS into one building. Facilities Management agreed, with the condition that they would support the project, but MCS had to actually run the project.

MCS formed a steering committee composed of senior partners to head the project. Facilities management stayed away from these meetings as much as possible during the early planning stages. The steering committee hired an outside consulting firm to help perform a need analysis and collect occupancy data, as well as find out what employees disliked about the current office arrangement.

The outside consultant collected data through four primary means: a survey requesting the employees to record their daily activities, needs, and preferences for the new office; a self-reported time log of employee activities; observational data to record office occupancy; and interviews across all job levels.

With this information, the firm was able to make recommendations that included: the amount of space the consolidated department would require, the preferred design of the new office, the number of workstations, alternative spaces needed (i.e., break-out areas, conference rooms, quiet rooms, etc.), and suggested ratios for pooled offices and workstations.[21]

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[21] Alexi Marmot Associates. (1992). Efficient space organization: Ernst & Young, MCS. London, England.

In addition to the outside consultant, MCS also conducted a study on their own technology requirements associated with this type of environment.

Two additional committees, Accommodation and Advisory, were created to inform users of the project. The Accommodation group was comprised of top management, while the Advisory group was made up of a random selection of consultants from various practices in MCS. The Accommodation and Advisory groups were given copies of all reports, discussed recommendations, and had some (although very little) influence over planning. Although these two groups were formed to help plan the project, in reality, they had very little control over the project. Partners made all of the decisions regarding the space, and rejected some of the ideas sent to them by the groups and the outside consulting firm, such as pooled offices.

The head of MCS sent out a series of three notes over a period of six months to update users on the progress. Also, the partners were given a progress report at their monthly meetings, and this information was passed on to other users.

Design

Office Area

One complaint that occurred after the first implementation of shared offices was the lack of natural lighting in the office. Partners were located in enclosed offices near the windows, so very little light was reaching other work areas. To help correct this problem, glazed glass was installed along the front walls of the partner offices. Tall storage cabinets were removed from the offices, and partners were requested not to place any large furniture in front of these glass panels. As a result, much more natural lighting was able to reach the center area of the office.

In addition, several partners agreed to move their offices to the center of the building, leaving the window areas for staff that worked in the office 100% of their time.

It is important to note here that several plans for the design of the office were submitted to the partners by Facilities Management for their approval. In the first plan, Facilities Management had incorporated all of the suggestions made by the outside consulting firm, such as conference rooms, projects rooms, and quiet workspaces provided on each of the floors, as well as pooled desks at a ratio of 2 or 2.5 employees to each desk rather than shared-assigned workstations. Many of these ideas and recommendations were rejected by the partners because of cost and space constraints, as well as cultural barriers.[22]

No conference rooms, project rooms, or quiet workstations were provided to the employees. In addition, the department was operating with approximately 5%[23] less space than they should have had. The desk ratios were actually around 3 to 1, as was the case in the first project. The only alternative spacing provided to employees were break-out areas with informal furniture, one of which was included on each floor.

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[22] Partners at Ernst & Young received a percentage of the profits in their divisions. Space costs were charged back to the departments, thus potentially decreasing the amount of profits at the end of the year. The partners in MCS were unwilling to pay for any additional space. Facilities Management had to therefore operate within this space/cost constraint.

[23] Interviews with Facility Management and head of MCS.

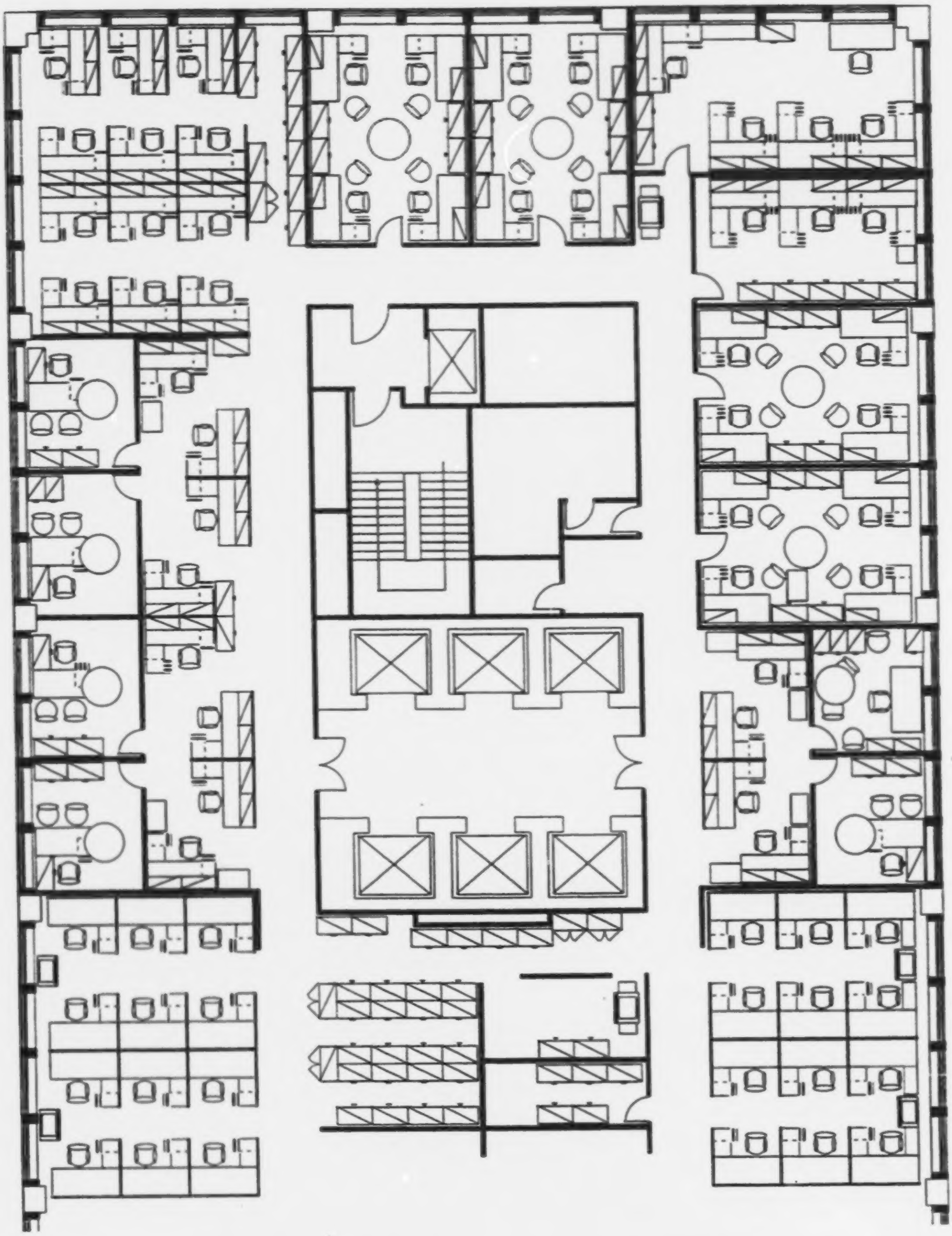

Figure 144: Floorplan of Ernst and Young MCS#2

Photo 63:

Workstations

The workstations changed very little in their overall size. All of the original furniture was used in the new office. The high paneling, however, was replaced with low paneling. This change was incorporated into the design to facilitate natural lighting in the office, as well as open communication among the consultants.

As mentioned above, the workstations were assigned using a ratio that was higher than recommended for the department, 3 employees to a desk versus 2 or 2.5.

Storage

For Project 2, the floor-to-ceiling and overhead storage units were replaced by mid-level storage units. Storage bins were also removed from the corridors and placed near the actual workstations. This alternative greatly increased the amount of natural light in the office, however it eliminated a fairly large amount of storage space.

Space Costs

Before moving into Becket House, MCS occupied 23,562 square feet at a cost of £110 per square foot. After the move, MCS occupied 15,000 square feet, at a space savings of 8,562 square feet. This translated to an annual lease savings of close to £1 million for MCS.

Technology

Computers

Each workstation was equipped with a computer in the second installation. The major difference between the installations in terms of technology was not the actual workstation technology, but the increased access to portable technology. The home technology package that was planned for the second project included a portable computer, modem, home printer, and home fax for employees that could show that they had a need for such equipment ("need" is based on the number of hours equipment will be used per week; usually 12-14 hours per week constitutes a minimum threshold).

Telephones

In Project 2, each employee was given a personal identification number to eliminate the need to go through reception. Users could log their PIN into the telephone system to pull their calls wherever they were working.

Photo 65: Ernst & Young MCS#2 Storage

Appendix C:
Detailed Workplace Strategy Site Descriptions—Shimizu Institute of Technology

Planning Engineering Department

Location:	Tokyo, Japan
Number of Users:	18
Date Implemented:	April 1987
Job Types:	Researchers of Architecture, Fire Safety, and Computer Systems

Background

The primary goal of this project was to improve the work environment. An additional goal was to also develop a space planning system that would allow small changes in staff size without requiring changes to the physical environment. The primary means of accomplishing these goals was to provide at least two types of work areas (open and paneled workstations), new storage alternatives, and a new telephone system.

Implementation Process

The senior manager of this group originally came up with the idea of implementing some form of non-territorial office back in 1986. The manager approached his management with a proposal, which was initially rejected. The senior manager persisted and was eventually given approval to conduct the free-address project.

The planning period for the free-address office occurred over a one year period. A detailed in-house study was undertaken during this period to understand exactly how the space was being used by the employees and to determine the feasibility of a free address office. This study included time lapse photography to accurately monitor who was in the office and for how long, interviews and observations about the use of personal belongings in the office, and formal surveys.

After studying the data and determining a reasonable margin of success, the senior manager, in consultation with one of his staff members, designed the office. Two months before implementation, the proposed plans were hung in the department for employee review. At this time, any questions regarding the new office were answered. One month before implementation, explanations were given to all managers on how the office was to be used and managed. Immediately before the office

Photo 66: Shimizu Overall Office Before Free-Address

Photo 67: Shimizu Planning Engineering Department after Free-Address

design was implemented, written information on the use of the office was distributed to all of the staff.

Design

Office Area

The free-address office for the Planning Engineering Department was the same size as their previous space. The new office contained three different types of work areas and two storage areas. The desk to employee ratio was atypical for a non-territorial office, with 30 workstations being provided for 18 users. This 3:5 employee-to-desk ratio goes back to the driver to create an office system that would allow for changes in staff size without having to change the configuration of the office.

Workstations

The center of the room originally held three large open work tables set up for six people at each table. Two of the tables had no partitions between the workstations, while the third had a low (approximately one foot) panel dividing the table into three workstations on either side. One side of this table was reserved for the two support staff working in the department. These workstations were generally used for individual work requiring additional workspace or team projects because the employees could utilize more than one workstation at a time.

After the two later projects were implemented, one of the large tables was modified to a meeting table by replacing four of the desks with two semi-circular desk pieces on either end of the two desks. This work area was used as a meeting table and work space for both individuals and groups.

The third work areas were workstations located against the window wall. The workstations consisted of two desks separated by a low panel. A high panel separated both workstations from the large office area. These desks provided users with a sense of visual privacy and were used for more concentrative work.

Storage

Three kinds of storage were available to the department employees. Each users was provided with a mobile pedestal

Photo 68: Shimizu Planning Engineering Meeting Space

Photo 69: Shimizu Planning Engineering Private Workstations

containing two shallow drawers and a file drawer. These pedestals contained as much storage space as the users' individually assigned desks prior to the free-address office. Each pedestal fit underneath the desks.

For group storage, filing cabinets and a high density floor-to-ceiling storage were provided. The implementation of the free-address office resulted in an overall reduction of storage by about 30%.

Technology

Computers

Laptop computers were provided to all users. These laptops were used both in the office and at client sites. When in the office, these laptops could be downloaded on to terminals linked to the mainframe.

Telephones

Cordless telephones were purchased to free individuals from being tied to a specific desk. Some of the lines were shared due to technology limitations of these early cordless phones. Small flashing lights were added around the office to help users distinguish which lines were ringing.

When individuals were out of the office they left their telephones with the secretaries who then handled all the calls.

Photo 70: Shimizu Planning Engineering Portable Storage

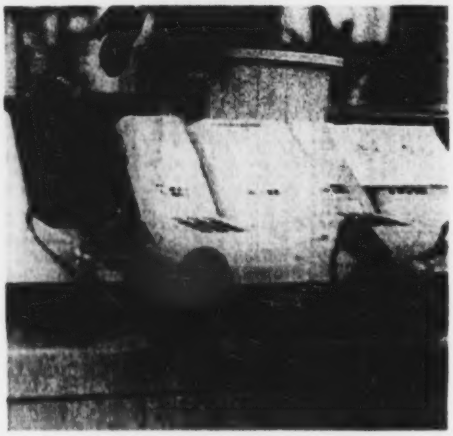

Photo 71: Shimizu Planning Engineering Cordless Telephones

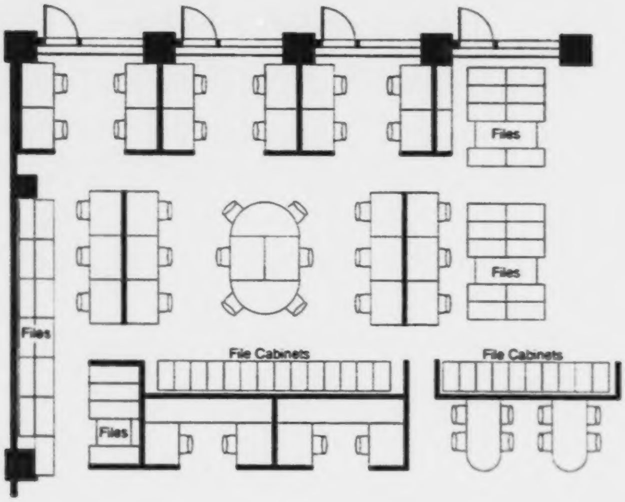
Files
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Figure 145: Shimizu Planning Engineering Department Floorplan

The Construction and Structural Engineering Departments

Location: Tokyo, Japan
Number of Users: Construction Engineering—24 users
Structural Engineering—42 users
Date Implemented: May 1991
Job Types: Research and Engineering

Background

In April of 1991 Shimizu opened a new headquarters building in Hamamatsu-cho. The Information Department was moved from the Institute of Technology to the new headquarters. With the relocation of the Information Department, space was freed in the Institute of Technology. The layouts of the different departments at the Institute, therefore, had to be changed to incorporated this space. The Planning Department saw this as an opportunity to expand the free-address concept which had been successful in their own department. The idea was proposed to the 12 department managers of the research institute. Two managers agreed to participate and volunteered their departments, Construction Engineering and Structural Engineering.

As with the first implementation of free-address at Shimizu, the goal in these two departments was not to reduce the overall space used, but rather to increase the efficiency of the office and the quality of the work environment.

These two departments had basically the same implementation process and the same final design. We, therefore, have treated them here as one case study, discussed below.

Implementation Process

In November of 1990, the Director of the Planning Engineering Department suggested to the upper level management that implementing free-address offices was a more efficient and effective way to utilize the space being vacated by the Information Department. Based on the success of the first free-address office, management agreed. A proposal defining the concept of free-address and asking for participants was made to the twelve department heads located at Shimizu Institute. Two departments agreed to participate: Construction and Structural Engineering.

The Construction Engineering Department was in charge of researching construction methods, architectural properties, concrete, and construction management. The Structural Engineering Department researched steel structures, earthquake engineering, and civil/structural engineering.

After the departments agreed to participate, the Director of Planning then held separate meetings with the managers and group leaders of the two departments to explain the free-address concept in more detail. Three liaisons were chosen from each department to help understand the user needs and identify potential problems.

A wide range of information was collected to assist in planning the implementation. The data collection methods used included:

- Questionnaires: All users answered a questionnaire about how the offices were used and how users felt about their offices (both departments and another uninvolved department were asked to fill these out for comparison).

- Time lapse photography study: Time lapsed photographs were taken of the two departments for a period of one week to see how their original space was actually used.

- Meetings with the liaisons of both departments to collect additional user requirement information.

The liaisons had some control over the design and planning of the free-address offices, but this control was limited. For example, the number of workstations, overall design of the office, the types of storage facilities, and the technology were all predetermined by the Director of Planning, while the liaisons were responsible for the addition of task lights on some of the workstations, the removal of drawers from under the desk tops, and the addition of larger casters on the mobile pedestals to facilitate movement on the carpets.

Users were asked to attend a three-hour instructional meeting after normal office hours to learn about how to use the office. Of the twenty-four employees in Construction Engineering, six users attended this three-hour meeting, while five of the forty-two employees in Structural Engineering attending the three-hour meeting. The Structural Engineering department also held a one-hour meeting during office hours before the implementation of the new office environment to explain free-address. Fifteen people took part in this meeting. The Construction Engineering department had a similar type meeting, but this session was not held until after the free-address office concept was implemented.

In addition to an overview of the free-address office, users were told of the office use policies during these initial meetings. Some of these use policies included:

- If users were away from the office for more than half a day, they should clean up the desk top so that another user could use the desk.

- Users could move another user's pedestal to under another desk if they wanted to use the desk.

Design

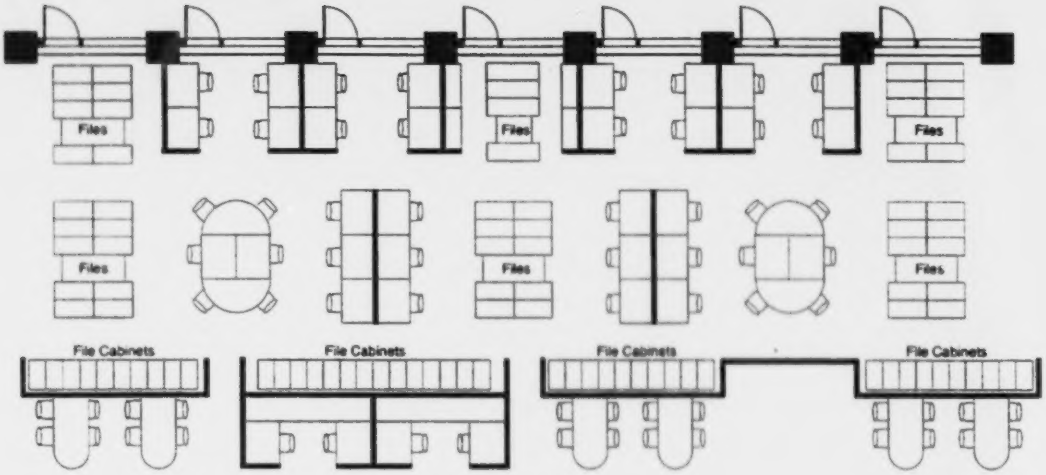
Office Area

As a result of the new office environment, each of the departments experienced an increase in their overall space. The Construction Engineering department went from 1,102 ft^2 before implementation to 1,929 ft^2 after implementation, while the Structural Engineering department went from 1,929 ft^2 to 2,204 ft^2.

In addition to an increase in overall office space, several different styles of work areas were added, as well as common space. For example, a tea break area was added for the departments as an outcome of the implementation .

Workstations

The Construction and Structural Engineering departments both experienced an increase in the number of workstations provided in their departments as a result of the new environment. The Construction Engineering department went from 25 desks to 40 desks, while the Structural Engineering department went from 44 to 57. These desk-to-employee ratios are


Files
Files
Files
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Files
Files
File Cabinets
File Cabinets
File Cabinets
File Cabinets

Figure 146: Shimizu Construction Engineering Department Floorplan

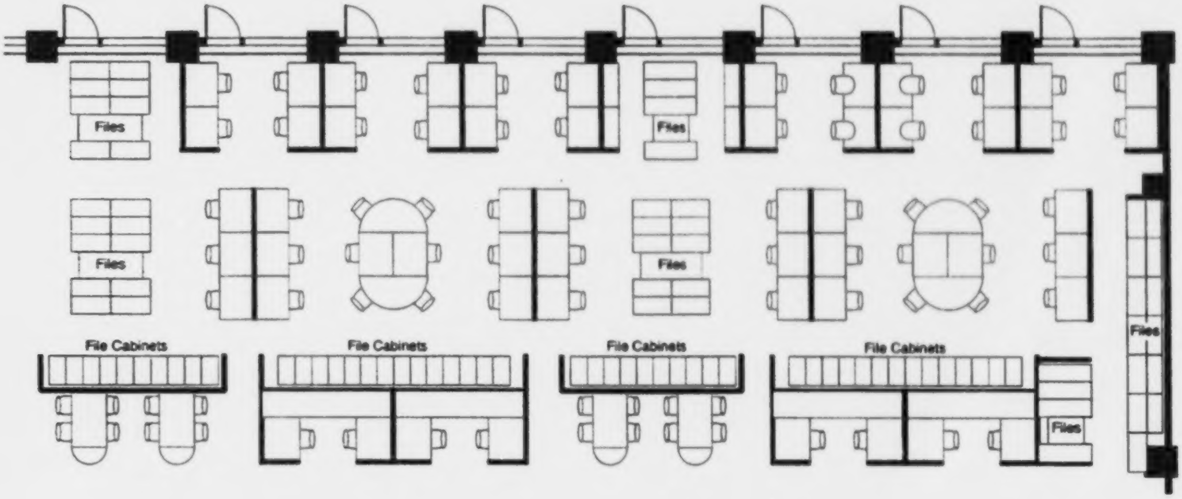
Files
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Figure 147: Shimizu Structural Engineering Department Floorplan

similar to that in the Planning and Engineering department (5:3, 5:3, and 4:3 respectively).

Four different styles of work areas were available for use in the office, as was also the case in the first implementation of free-address:

- Large open work tables made of six desks and no partitions.
- Large open work tables with low panels (approximately 1 foot high) separating the desks down the center.
- Four desks against the window wall with low panels separating pairs of desks and high panels on the ends. These desks were intended for more concentrative, independent work and some visual privacy.

- Large open tables composed of two desks and two half-round desks which could be used as a large meeting table or for individual work.

One of the primary intentions of the large open tables was that users could spread out and utilize more space than would normally be available.

Storage

Three kinds of storage were provided to the departments. Each users was given a mobile pedestal containing two shallow drawers and a file drawer. These pedestals contain as much storage as the users' desks prior to implementation, and were designed to fit under the desks. For group storage, regular filing cabinets were provided, as well as high density moving-rack shelving units. The "Moving Rack" consisted of open shelving units mounted on a track that allowed them to roll apart for access.

The total amount of group storage was 50% greater in the free-address environment than it was in the previous office accommodations.

Technology

Computers

Unlike the earlier free-address implementation in the Planning Engineering Department, these departments did not move to laptop computers with the installation of the free-address office. The departments continued to use regular desktop personal computers (both IBM compatibles and Apple Macintosh). Some of these machines were connected to the LAN and printers.

Telephones

Instead of using mobile telephones, the two departments had a direct dial programmable telephone system installed. When an individual sat down at a new desk they could type in their own personal direct dial number and have calls routed there. When users were out of the office their calls were taken by the secretaries.

Appendix D:
Cornell Workplace Survey

International Facility Management Program

CORNELL UNIVERSITY
NYS College of Human Ecology

Workspace Survey

PART 1: Background Questions

PART 2: Overall Workspace Ratings

PART 3: Comparative Workspace Ratings

PART 4: Alternative Workspace Ratings

This survey typically takes 15 to 20 minutes to complete.

PURPOSE:
The purpose of this survey is to identify aspects of the workplace which work well or could be improved from the employees' perspective. No data will be associated with any specific individual.

PART 1. Background Information

Site/Bldg. ____________________

INSTRUCTIONS: Please circle the letter next to the appropriate response, except where blanks are provided for your response.

1. Please circle the letter which best describes your PREVIOUS workstation:
   a. Individual enclosed office (floor to ceiling walls)
   b. Individually assigned desk or workstation surrounded by high panels on at least two sides (i.e. cannot see over the panels when seated)
   c. Individually assigned desk or workstation surrounded by low panels on at least two sides (i.e. can see over the panels when seated) separating each desk or workstation in an open plan office
   d. Individually assigned desk in a large open space (no panels around each desk or workstation)
   e. Enclosed office (with floor to ceiling walls) for 2-4 persons in which each person has an assigned desk
   f. Other (please describe briefly)
   ____
   ____
   ____
   ____

2. How long have you been using the [new office system]?
   __________ months

3. What was the size of your previous workstation compared to the workstation where you can work now?
   a. smaller
   b. larger
   c. about the same

4. What is your position title?
   ____

5. What is the name of your department?
   ____

6. What is your gender?
   a. male
   b. female

7. What is your age?
   a. under 21
   b. 21-25
   c. 26-30
   d. 31-35
   e. 36-40
   f. 41-45
   g. 46-50
   h. 51-55
   i. 56-60
   j. 61 or over

Continued next page

8. Please circle the letter(s) that best describes your involvement in the planning and design process of the project.

a. Was not involved in the planning and design process of the project.
b. Attended informational meetings, but did not influence the design/direction of the project.
c. Completed surveys.
d. Filled out time/work pattern logs.
e. Provided information in focus groups/interviews.
f. Informal discussion with people who were directly involved in the planning process.
g. Participated in interactive meetings, and was able to influence the design/direction of the project.
h. Served on a planning committee.
i. Other____
____
____

9. On average, where do your work activities take place?

a. At customer site ________% of time
b. At office-individual desk or workstation ________% of time
c. At common areas in group/department area ________% of time
d. Other areas in the building ________% of time
e. Other [company] locations ________% of time
f. Home ________% of time
g. Travel ________% of time
h. Other ________% of time

PART 2: Overall Workspace Ratings

Instructions

Please evaluate your CURRENT WORKSPACE by responding to the questions below. Circle the appropriate number for your response. Please rate your SATISFACTION with the workspace, as well as the IMPORTANCE of each issue. If an item does not apply to your workplace, circle N.A. in the satisfaction column, but rate the issue's importance.

	SATISFACTION						IMPORTANCE				
General Satisfaction	**Very Dissatisfied**		**Neutral**		**Very Satisfied**	**Not Applicable**	**Not Important**		**Neutral**		**Very Important**
1. Overall, how satisfied are you with the [new office system]?	1	2	3	4	5	N.A.	1	2	3	4	5
2. Overall, how satisfied are you with the physical design of the [new office system]?	1	2	3	4	5	N.A.	1	2	3	4	5
3. Overall, how satisfied are you with the voice and data communications aspects of the [new office system]?	1	2	3	4	5	N.A.	1	2	3	4	5
4. Overall, how satisfied are you with your ability to communicate with your peers in the [new office system]?	1	2	3	4	5	N.A.	1	2	3	4	5
5. Overall, how satisfied are you with your ability to meet and communicate with your manager in the [new office system]?	1	2	3	4	5	N.A.	1	2	3	4	5
6. Overall, how satisfied are you with the training provided for working in the [new office system]?	1	2	3	4	5	N.A.	1	2	3	4	5
7. How satisfied are you with the extent that you were able to be involved in the planning and design process of the [new office system]?	1	2	3	4	5	N.A.	1	2	3	4	5
8. How satisfied are you with the effectiveness with which your organization implemented the [new office system]?	1	2	3	4	5	N.A.	1	2	3	4	5
9. How satisfied are you that the technology provided as a result of the [new office system] facilitates your work patterns?	1	2	3	4	5	N.A.	1	2	3	4	5
10. How satisfied are you with your overall productivity in the [new office system]?	1	2	3	4	5	N.A.	1	2	3	4	5

(continued on next page)

PART 3: Comparative Workspace Ratings

Instructions

Please evaluate your CURRENT WORKSPACE as compared to your PREVIOUS WORKSPACE, by responding to the questions below. Circle the appropriate number for your response. Please rate your SATISFACTION with the workspace, as well as the IMPORTANCE of each issue. If an item does not apply to your workplace, circle N.A. in the satisfaction column, but rate the issue's importance.

	SATISFACTION						IMPORTANCE				
Workspace	**Much Worse**		**About the Same**		**Much Better**	**Not Applicable**	**Not Important**		**Neutral**		**Very Important**
11. Ease of concentration	1	2	3	4	5	N.A.	1	2	3	4	5
12. Amount of work you are able to do alone (e.g. more reports, more information reviewed)	1	2	3	4	5	N.A.	1	2	3	4	5
13. Amount of work you are able to do in a group or as a team	1	2	3	4	5	N.A.	1	2	3	4	5
14. Quality of work you do alone (e.g. better ideas, fewer errors, more thorough work)	1	2	3	4	5	N.A.	1	2	3	4	5
15. Quality of work you do in a group or as a team	1	2	3	4	5	N.A.	1	2	3	4	5
16. Access to coworkers, team members, or managers	1	2	3	4	5	N.A.	1	2	3	4	5
17. Communication with co-workers (e.g. conversations about any topic)	1	2	3	4	5	N.A.	1	2	3	4	5
18. Communication with manager	1	2	3	4	5	N.A.	1	2	3	4	5
19. Ease of making telephone calls when you are in the office	1	2	3	4	5	N.A.	1	2	3	4	5
20. Ease of receiving telephone calls when you are in the office	1	2	3	4	5	N.A.	1	2	3	4	5
21. Ease of receiving telephone calls and messages when you are out of the office	1	2	3	4	5	N.A.	1	2	3	4	5
22. Ease of receiving mail	1	2	3	4	5	N.A.	1	2	3	4	5
23. Access to computers when needed	1	2	3	4	5	N.A.	1	2	3	4	5
24. Ease of dealing with confidential or sensitive issues while at work	1	2	3	4	5	N.A.	1	2	3	4	5
25. Ease of access to your own files and reference materials	1	2	3	4	5	N.A.	1	2	3	4	5

(continued on next page)

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PART 3: Comparative Workspace Ratings (Cont'd)

	SATISFACTION						IMPORTANCE				
Workspace (continued)	**Much Worse**		**About the Same**		**Much Better**	**Not Applicable**	**Not Important**		**Neutral**		**Very Important**
26. Auditory privacy (e.g. not being distracted by office noise, other conversations, etc.)	1	2	3	4	5	N.A.	1	2	3	4	5
27. Conversational privacy (e.g. not being overheard by others)	1	2	3	4	5	N.A.	1	2	3	4	5
28. Visual privacy (e.g. not being distracted by others working or passing by)	1	2	3	4	5	N.A.	1	2	3	4	5
29. Stress level at work	1	2	3	4	5	N.A.	1	2	3	4	5
30. Amount of storage space for personal items (coat, shoes, purse, etc.)	1	2	3	4	5	N.A.	1	2	3	4	5
31. Amount of storage space for work materials (files, binders, books, etc.)	1	2	3	4	5	N.A.	1	2	3	4	5
32. Opportunity to display personal items (photos of family, art work, etc.)	1	2	3	4	5	N.A.	1	2	3	4	5
33. Opportunity to display work-related materials (charts, diagrams, etc.)	1	2	3	4	5	N.A.	1	2	3	4	5
34. Informal break areas (small lounges, seating areas, etc.) in group or department area	1	2	3	4	5	N.A.	1	2	3	4	5
35. Dedicated project or team rooms for group or department use	1	2	3	4	5	N.A.	1	2	3	4	5
36. Reference/resource/information centers in department or group area	1	2	3	4	5	N.A.	1	2	3	4	5
37. Number of conference rooms	1	2	3	4	5	N.A.	1	2	3	4	5
38. Location of conference areas	1	2	3	4	5	N.A.	1	2	3	4	5
39. Ease of scheduling conference facilities	1	2	3	4	5	N.A.	1	2	3	4	5
40. Accommodations for small informal meetings (of 2-6 people)	1	2	3	4	5	N.A.	1	2	3	4	5
41. Sense of being valued by your company	1	2	3	4	5	N.A.	1	2	3	4	5

(continued on next page)

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PART 4: Home Workspace Ratings This section deals with your feelings about working AT HOME.

	SATISFACTION						IMPORTANCE				
Working at Home	**Much Worse**	**About the Same**			**Much Better**	**Not Applicable**	**Not Important**		**Neutral**		**Very Important**
42. Access to necessary technology at home (laptops, telephone, fax, printer, etc.)	1	2	3	4	5	N.A.	1	2	3	4	5
43. Ability to handle mail, text processing, etc. with the tools provided at home	1	2	3	4	5	N.A.	1	2	3	4	5
44. Ease of concentration at home	1	2	3	4	5	N.A.	1	2	3	4	5
45. Amount of work you are able to do at home (e.g. more reports, more information reviewed)	1	2	3	4	5	N.A.	1	2	3	4	5
46. Quality of work you do at home (e.g. better ideas, fewer errors, more thorough work)	1	2	3	4	5	N.A.	1	2	3	4	5
47. Overall productivity at home	1	2	3	4	5	N.A.	1	2	3	4	5
48. Communication with co-workers from home	1	2	3	4	5	N.A.	1	2	3	4	5
49. Communication with manager from home	1	2	3	4	5	N.A.	1	2	3	4	5
50. Stress level at home	1	2	3	4	5	N.A.	1	2	3	4	5

Additional Factors

Below, please list any additional factors which you believe impact, positively or negatively, your ability to work effectively.

Positive Factors: ____________________

____

____

____

Negative Factors: ____________________

____

____

____

THANK YOU VERY MUCH FOR YOUR COOPERATION.

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Appendix E:
Cornell Interview and Focus Group Questions

Facility/Premises Management Interview Questions

General Information

- What drove the selection of the innovation?
- How many people are involved in the project?
- What principal type of work do they do?
- What are the goals/drivers of the project?

Process

- Who "owns" the project?
- How were user work patterns/technology requirements/occupancy rates determined?
    - Were user focus groups conducted?
    - Surveys?
    - Interviews?
    - Was an outside consultant hired?
- Was the project a team effort? What was the role of Facilities Management in the project? Space planning consultants? Management Information Systems? Human Resources? Were there any committees involved? Who participated?
- Description of user involvement: how/to what extent were users involved in the project? Could users influence the design/direction of the project?
- Was a Post Occupancy Evaluation conducted? What were the results of this examination? Was anything changed in the system in response to information from the P.O.E.?

Technology

- What type of office/non-office technology did employees have before implementation?
- What new office/non-office technology was provided for users?
- Was technology provided in such a way as to facilitate employee work patterns?
- Was a standard technology package offered? Please describe it.
- How are voice communications handled? How did this change as a result of the project?
- Please describe new technology:
    - Why were employees given new technology?
    - Who received the new technology?
    - What is special about it?
    - How does it work (How are calls transferred in? How do employees link their laptops?)?

Design

- Are there a variety of spaces available for employees' use? What are they? How is this different from the previous way of working?

- How many workstations are available?
- What is the use policy for each of the workstations?
- What is the justification for the different workstations?
- What is available for each workstation (desk, chair, telephone, storage, computer equipment, docking station for portables, office supplies, etc.)? What individual components make up each workstation? How has this changed from previous workstation?
- Is personal storage provided? Is this greater/less than previously provided? What type of personal storage provided (file carrier, pedestal, personal storage cupboards)?
- Is common/team storage provided? More or less than before?
- Were more common areas (conference rooms, break areas, team project rooms, etc.) added to the design? Why, or why not?
- What are the space savings associated with the change?
- What special equipment was purchased for the project? What were the costs associated with this equipment?
- How are voice communications handled?
- Were you involved with the pilot project? If YES, in what capacity? What, if anything, did you do differently with this facility?
- How much did you know about the pilot project? What problems were you able to avoid because of previous knowledge of pilot program?

Project Manager Interview Questions

General Information

- What type of innovation is going on in the organization?
- What drove the selection of the innovation?
- Is this innovation part of a strategic initiative (the various implementations were conceived with respect to a conscious, deliberate management policy) or an independent initiative (conceived by the management of a specific department, branch, or area office)?
- What are the goals/drivers behind the innovation?
- When was the project first initiated?
- How many locations within the organization have implemented this type of innovation? Where are they? What departments/business units/groups are involved at each site?
- How many people are involved in the project at each location?
- What are the job types of participants (consultants, sales, support, etc.)
- If part of a strategic initiative, are the goals/drivers the same for each site? If not, why?
- Who are the key people involved in the implementation of the project (at each site as well as company wide)? Who was instrumental in supporting the innovation?

Process

- Who was in charge of the project? Was the project a team effort? What was the role of Facilities Management in the project? Space planning consultants? Management Information Systems? Human Resources? Were there any committees involved? Who participated?
- Who "owns" the project?
- How were employee work patterns/technology requirements/occupancy rates determined?
    - Were user focus groups conducted?
    - Surveys?
    - Interviews?
    - Was an outside consultant hired?

- Were users volunteers?
- How was the system initially presented to employees? Did they have input in the selection of the system?
- What incentives, if any, were used to make the system attractive to employees?
- Description of user involvement: how/to what extent were users involved with the project? Could users influence the

design, direction of the project?

- Are all levels (including management for the group involved) participating?
- Does the innovation require a different style of managing employees? Was education provided for managers? What was the nature of this education (how long, mandatory or voluntary)?
- What type of training was provided for employees in terms of working in the new environment, new technology, etc.? What was the nature of this training (how long, mandatory or voluntary)?
- How long was the planning period? How much time passed between the time that the decision was made to move towards the innovation and implementation?
- What has been done to monitor the success of the project? How is the project reviewed?

Technology

- What type of office/non-office technology did employees have before implementation?
- What new office/non-office technology was provided for users?
- Was technology provided in such a way as to facilitate employee work patterns?
- Was a standard technology package offered? Please describe it.
- How are voice communications handled? How did this change as a result of the project?
- Please describe new technology:
    - Why were employees given new technology?
    - Who received the new technology?
    - What is special about it?
    - How does it work (How are calls transferred in? How do employees link their laptops?)?

Design

- Are there a variety of spaces available for employees' use? What are they? How is this different from the previous way of working?
- How many workstations are available?
- What is the use policy for each of the workstations?
- What is the justification for the different workstations?
- What is available for each workstation (desk, chair, telephone, storage, computer equipment, docking station for portables, office supplies, etc.)? What individual components make up each workstation? How has this changed from previous workstation?
- Is personal storage provided? Is this greater/less than previously provided? What type of personal storage provided (file carrier, pedestal, personal storage cupboards)?

- Is common/team storage provided? More or less than before?
- Were more common areas (conference rooms, break areas, team project rooms, etc.) added to the design? Why, or why not?
- What are the space savings associated with the change?
- What special equipment was purchased for the project? What were the costs associated with this equipment?
- How are voice communications handled?
- Were you involved with the pilot project? If YES, in what capacity? What, if anything, did you do differently with this facility?
- How much did you know about the pilot project? What problems were you able to avoid because of previous knowledge of pilot program?

Business Manager Interview Questions

General Information

How many employees do you manage?

Of those, how many have adopted THIS INNOVATION?

What principle type of work is done by the employees involved with the innovation?

Where do these employees work most often (office, client's office, home, etc.)?

What are the goals/drivers of the project?

Who, to your knowledge, were the key people involved in planning and implementing the project?

Culture

- Please give me an example of what you think is a good worker. For example, someone who takes the initiative, someone who works well alone, with others, polite, punctual, etc.?

- Please define what you feel is good supervision.

- What do you think are your department's values or thinking that guides the **actual** use and allocation of space? This is not the rule that the organization gives, but how space is actually used in your area.

- How do you feel your organization views change or risk taking? Do they encourage/support it, resist it?

- To what extent does your organization support individual workstyles, appearance, etc.?

Process

- How was the concept of THIS INNOVATION presented to your employees? Were they given a menu from which they could chose how they wanted to work? was there any sort of standard package that was given to an employee based on which way they decided to work? For example, if someone said they wanted to work at home, were they given a computer, fax, printer, etc.?

- How were your employee work patterns/technology requirements/occupancy rates determined?
  - Were user focus groups conducted?
  - Surveys?
  - Interviews?
  - Was an outside consultant hired?

- Were the users in your department/business unit/group volunteers or were they drafted into the project?

- Describe your (your peers') involvement in the project: To what extent were you involved in the planning of the project? Were you (your peers) able to influence the design/direction of the project?

- Describe user involvement in the project: To what extent were your employees involved in the planning of the project? Were employees able to influence the design/direction of the project? Were they able to chose as an individual the way in which they wanted to work, or did the entire group have to chose the same package? What sort of accommodations, if any, were made for those people that did not want to participate , or that wanted their own desk, office?

- Are all levels of employees participating in the project in your area?
- Does the innovation require a different style of managing employees? Were you (your peers) provided an special training? What was the nature of this training (how long, mandatory, voluntary)? Do you feel that education (or additional education) is necessary?
- How do you measure employee performance? How has the system affected your employees' overall performance on the job? How have the marks changed as a result of the new way of working? What sort of things are employees evaluated on? Can we see a blank copy of an evaluation form?
- To what extent do you feel this is a better way of working? If you were given the choice, would you return to the old office system? Why or why not? What would you lose? what are some of the key components of the system that you would keep?
- What sort of programs have been set up in your area to monitor the success of the project?
- Please describe a typical work week for you. How has this changed as a result of adopting the new way of working?
- Have you experienced any problems managing under this concept, such as getting in touch with employees, scheduling meetings? Please give an example. What sort of things have you tried to do to overcome the difficulties?
- Have you noticed any new patterns in space use? If yes, describe them.
- How has the innovation affected your employees' ability to work as a TEAM? Do they usually work in teams?
- How has the innovation affected your employees' ability to work as an individual?
- Do your employees spend more or less time at the office than before implementing THIS INNOVATION? Do you see this as beneficial/harmful?
- Does the lack of personalization in the shared office seem to be a problem? Have employees expressed any concern over this issue? What measures have been taken to help alleviate this concern (if there is any)?
- How important do you feel personalization is to your employees?
- If you could re-invent the system, what would you do differently?
- What have you had the most feedback from employees about?

Technology

What type of office/non-office technology did employees have before implementation?

What new office/non-office technology was provided for users?

Was technology provided in such a way as to facilitate employee work patterns?

Was a standard technology package offered? Please describe it.

How are voice communications handled? How did this change as a result of the project?

Please describe new technology:

- Why were employees given new technology?
- Who received the new technology?
- What is special about it?
- How does it work (How are calls transferred in? How do employees link their laptops?)?

Design

- Are there a variety of spaces available for employees' use? What are they? How is this different from the previous way of working?
- What is the use policy for each of the workstations?
- What is the justification for the different workstations?
- What is available for each workstation (desk, chair, telephone, storage, computer equipment, docking station for portables, office supplies, etc.)? What individual components make up each workstation? How has this changed from previous workstation?
- Is personal storage provided? Is this greater/less than previously provided? What type of personal storage provided (file carrier, pedestal, personal storage cupboards)?
- Is common/team storage provided? More or less than before?
- Were more common areas (conference rooms, break areas, team project rooms, etc.) added to the design? Why, or why not?
- Are there ever times when the number of employees present exceeds the number of available workspaces? When/how often? What are employees expected to do in such instances?
- How did the actual office design change as a result of the implementation of THIS INNOVATION? Was there a reduction in the number of workstations, general office space, storage areas, etc.?

Focus Group Questions

General Information

What department/branch/business/group do you work in?

Job title?

What type of work do you do?

How long have you been working in the NEW office?

Have you ever worked with this type of office before? If yes, where?

Have you heard of this type of practice going on in other parts of the organization? Where? Please describe the information you have heard.

Process

- How was the concept of NEW office presented to you? Were you given a menu from which you could chose how you wanted to work? Was there any sort of standard package that was given to you based on which way you decided to work? For example, if someone said they wanted to work at home, were they given a computer, fax, printer, etc.?

- Please describe your involvement with the project. To what extent were you involved in the planning of the project? Did you (your peers) have any influence over the design/direction of the project? Were you able to chose as an individual the way in which you wanted to work, or did the entire group have to chose the same package? What sort of accommodations, if any, were made for those people that did not want to participate , or that wanted their own desk, office?

- Are all levels of employees participating in the project in your area?

- Did you serve on any committees with regards to this project? What was your role on the committee?

- What do you think the goals of the company were when they decided to use this type of innovation? Do you think they were successful in meeting all their goals?

- How were user work patterns/technology requirements/occupancy rates determined?
    - Were user focus groups conducted?
    - Surveys?
    - Interviews?
    - Was an outside consultant hired?

What type of training did your organization provide for working in this new environment? Were you trained on any of the equipment? What was the nature of this training (how long, mandatory/voluntary, etc.)? Was the training adequate?

Worker Productivity

Please describe what a typical work week is like for you. How has this changed as a result of the project?

In what ways has the innovation helped your effectiveness at work?

In what ways has the innovation hindered your effectiveness at work?

What tasks are easiest to carry out in the office?

Are there tasks which you "save" for other places (home, clients, etc.) because they are difficult to perform at the office?

Are there services (secretarial, printing, copying, etc.) that have become available as a result of the project? If YES, what are they?

Given the option, would you return to the old office system? What part of the system do you think you would lose/miss?

Technology

- What type of office/non-office technology did you have before implementation?
- What new office/non-office technology was provided as a result of this project?
- Was technology provided in such a way as to facilitate your work patterns?
- Was a standard technology package offered as a result of this project? What was it? What was the justification for receiving different aspects of the technology package (i.e., if you work out of the office 10-12 hours per week, you were given a laptop)?
- How are voice communications handled? Is this different than before implementation? Do you feel it is effective for your work environment? How would you change the system?

Design

What types of workstations are available to you? How is this different than before?

What is the use policy for each of the stations?

What is the justification for each of the workstations?

- What is available for each workstation (desk, chair, telephone, storage, computer equipment, docking station for portables, office supplies, etc.)? What individual components make up each workstation? How has this changed from previous workstation?
- Do you often use a specific workspace if it is available? If YES, why did you choose that space?
- Are you satisfied with the amount of space available for you to work? What type of space are you referring to when you answer this question (storage, work surface, circulation space, total office space, etc.)?
- Is personal storage provided? Is this greater/less than previously provided? What type of personal storage provided (file carrier, pedestal, personal storage cupboards)?
- Is common/team storage provided? More or less than before?
- Were more common areas (conference rooms, break areas, team project rooms, etc.) added to the design? Why, or why not?

- Are there ever times when the number of employees present exceeds the number of available workspaces? How often does this happen? What do you do then?

Other Issues

What do you like best/least about the project?

Do you find it more difficult to speak to others in the office? Why?

What specific problems arise because of not "owning" space in the office?

What, if anything, do you do to personalize the space you are working in or any space allocated to you?

How important is it to you to personalize your work area?

Culture

- Please give me an example of what you think is a good worker. For example, someone who takes the initiative, someone who works well alone, with others, polite, punctual, etc.?
- Please define what you feel is good supervision.
- What do you think are your department's values or thinking that guides the **actual** use and allocation of space? This is not the rule that the organization gives, but how space is actually used in your area.
- How do you feel your organization views change or risk taking? Do they encourage/support it, resist it?
- To what extent does your organization support individual workstyles, appearance, etc.?

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Workscape 21

The Ecology of New Ways of Working

Implementing Innovative Workplaces

Organizational Implications of Different Strategies

Summary Report

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Finally, we would like to thank all of the users who live in and with the innovations we studied for taking the time to share their personal experiences with us.

Foreword

The International Workplace Studies Program, formerly the International Facility Management Program, is a research program based in the College of Human Ecology Cornell University in Ithaca, New York. The program was launched in 1989 and is supported by a consortium of private and public sector organizations in the United States, United Kingdom, Europe, and Japan. The IWSP mission is to generate research-based information related to the planning, design, and management contribute to the development of more competitive and effective organizations.

Introduction

Companies all over the world are introducing new workplace strategies as a means of building more competitive organizations. Of key concern when implementing such strategies is the innovation process; how the organization can implement new working practices successfully on a large scale, and how different facets of the implementation process influence its long-term success. The *Implementing Innovative Workplaces* study examined the implementation processes for new workplace practices—more specifically, non-territorial offices—in five international organizations in four different countries: IBM and Ernst & Young in the United Kingdom; Digital Equipment's Natural Office in Sweden; the SOL Cleaning Company headquarters in Finland; and the Shimizu Institute of Technology in Japan.

Defining Non-Territorial Offices

For the purpose of this report, non-territorial offices were defined as offices where employees did not have individually assigned desks, workstations, or offices. Employees used whatever space they preferred when they came into the office, and no one person was associated with any particular workspace. Employees chose their workspace on a first come, first served basis, or in some cases, organizations allowed employees to reserve a space before they arrived.

Study Goal

The goal of the report was to better understand how the implementation strategies of these different workplace innovations affected user satisfaction, work effectiveness, duration and acceptance, cost to implement the project, and organizational learning. It also investigated how these different approaches or strategies changed over time as the concept moved from a small scale implementation to a corporate-wide program.

Key Research Questions

The specific research questions that the *Implementing Innovative Workplaces* report addressed included:

- What factors (i.e., planning and design process, nature of technology, the design of the setting) tended to change the most as projects evolved?
- What aspects of the new workplace system tended to become standardized or uniform?
- Were there consistent patterns of employee response as organizations expanded their implementation of new workplace strategies (within or across sites)?
- What differences existed in terms of cost and employee response as a function of whether the workplace system was primarily cost-driven versus business-driven?
- What were the organizational implications of solution-oriented vs. process-oriented workplace systems?
- How did the implementation process change as projects moved from the pilot stage to widespread implementation? Was it necessary to focus as much attention on all three factors (design, technology, and planning process) in second and third installations to ensure similar success patterns?
- What was the nature of organizational learning that occurred as a function of whether the workplace system was process- vs. solution-driven, cost- vs. business-driven, or part of a strategic versus an independent initiative?

Methodology

The research was organized as a series of comparative case studies of variations of non-territorial offices. Cases were compared within an organization to examine the nature of organizational learning and how the process evolved over time. Cases were also compared across organizations to examine the nature of similarities and differences as a function of whether the workplace strategy was implemented as either a strategic or independent initiative; motivated primarily by the desire to increase performance as opposed to reduce costs; or was solution- vs. process-oriented. The innovation process was examined in different countries to better understand whether aspects of the process differed as a function of different national cultural patterns, values and expectations.

The IWSP used four data collection methods to examine the implementation process at each of the sites: (1) employee surveys to determine satisfaction and effectiveness ratings with the workplace innovation; (2) interviews or focus groups with users and managers; (3) interviews with key facilitators of the system; and (4) archival data involving space allocation and costs. Each of the techniques was used in combination, rather than as a single entity, to help define the new office innovation and user response.

Definition of Research Design Variables

Strategic vs. Independent Initiatives

Strategic initiatives were those in which several implementations within the same organization were conceived with respect to a conscious, deliberate management policy. *Independent initiatives* were conceived and carried out by the management of a specific department, branch, or area office without reference to what standard practices were in other locations.

Business-Driven vs. Cost-Driven Models

Business-driven projects were those whose starting point was an interest in exploring new ways of working, challenging the conventional ideas of where, when, and how work should be done. Cost-reduction was typically not a major consideration. *Cost-driven* models were those whose primary motivation was the desire to reduce costs; that is, without significant pressures to reduce costs it is unlikely that the new workplace strategy would have been implemented. The cost-driven models at times sought business enhancement as well, but this was often a secondary, less important benefit of the project.

Solution-Oriented vs. Process-Oriented Implementation

Solution-oriented projects identified a prototype workplace strategy and then worked to implement that same workplace strategy across many different sites, albeit with minor variations. *Process-oriented* approaches developed a set of guiding principles and standardized the methods for analyzing work patterns and practices. Companies then used the information collected from these processes to develop custom-tailored solutions specific to each situation. Thus, the workplace solutions developed at sites across the organization tended to look very different, even though the same principles and processes guided their development.

Table 1 reflects how we classified each of the organizations according to the implementation strategies they employed.

Table 1: Research Site Selection

	Business vs. Cost	Process vs. Solution	Strategic vs. Independent
IBM, UK	Cost	Solution	Strategic
Ernst & Young, UK (MCS)	Cost	Solution	Independent
DECsite's Natural Office	Business	Solution	Independent
SOL Headquarters	Business	Process	Strategic
Shimizu	Business	Solution	Independent
(Ernst & Young, US)	Cost	Process	Independent
(Digital Equipment Corporation, UK)	Cost	Solution	Strategic
(Chiat/Day, US)	Business	Process	Strategic

Parentheses indicate sites discussed based on our research and research conducted by other sources, but not studied in depth of the *Implementing Innovative Workplaces* Study.

Findings of the Implementing Innovative Workplaces Report

Our research indicated that the most important aspect of implementing innovative workplace practices was the process behind the implementation. When comparing user satisfaction and work effectiveness for each project according to the technology, design, and process behind the innovation, the nature of the planning process had the most influence over user response. As the process became less intricate, user satisfaction and effectiveness ratings decreased.

The Implementation Process Model

Figure 1 illustrates the different phases of the implementation process and the relationship of these phases to one another. The starting point for most organizations was determining which organizational challenge(s) they were addressing with the project. The projects then followed a range of patterns throughout the model according to the different strategies employed. As the arrows in Figure 1 indicate, the process was iterative; as certain stages of the process were conducted, they may have affected either previous or later stages in the process.

Business- versus Cost-Driven Strategies

Cost-based strategies tended to exclude the work reassessment and business change phases of the process, focusing the majority of their resources on developing the alternative workplace strategy and the associated space and technology configurations (see Figure 2: Cost-Driven Implementation Process Model). Business-oriented strategies, on the other hand, placed much more emphasis on these two phases.

Some of the key differences between the implementation processes for business- versus cost-driven strategies included:

- Organizations approaching the innovation from a business standpoint tended to focus on goals that significantly impacted the way in which they conducted their business. In contrast, organizations using cost-oriented approaches tended to focus on short-term goals, such as reducing overall real estate costs, rather than attempting to change the way in which they worked.

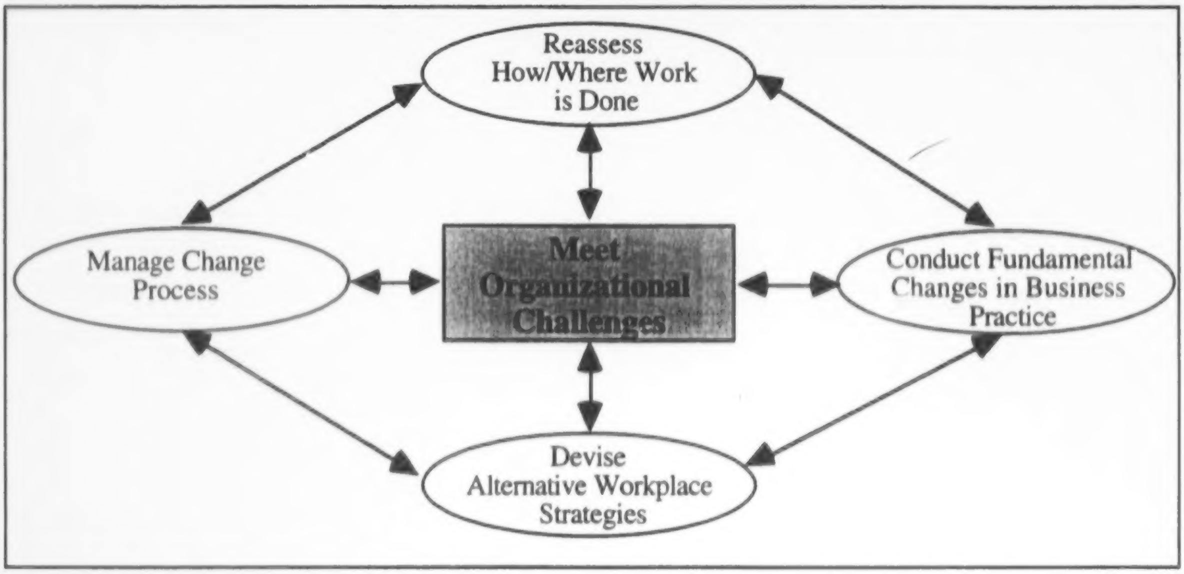
Reassess How/Where Work is Done
Manage Change Process
Meet Organizational Challenges
Conduct Fundamental Changes in Business Practice
Devise Alternative Workplace Strategies

Figure 1: Phases of the Implementation Process Model

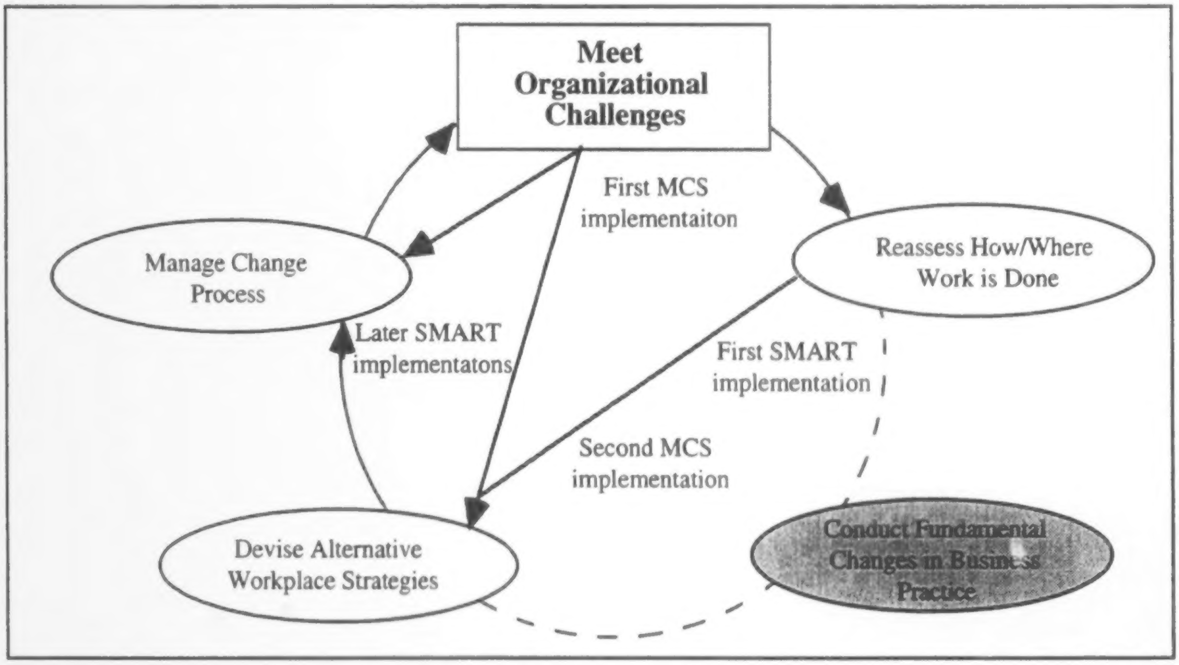
Meet Organizational Challenges
First MCS implementaiton
Manage Change Process
Reassess How/Where Work is Done
Later SMART implementatons
First SMART implementation
Second MCS implementation
Devise Alternative Workplace Strategies
Conduct Fundamental Changes in Business Practice

Figure 2: Cost-Driven Implementation Process Model

- Business-oriented strategies often looked at the projects as a means of reengineering the organization. The organizations using these strategies, therefore, strongly emphasized how/where/why employees currently worked the way they were to find areas for improvement in the overall system. Organizations using a cost-based approach, on the other hand, often eliminated this phase of the project.

- Business-oriented strategies more often resulted in significant changes in management philosophies and practices,

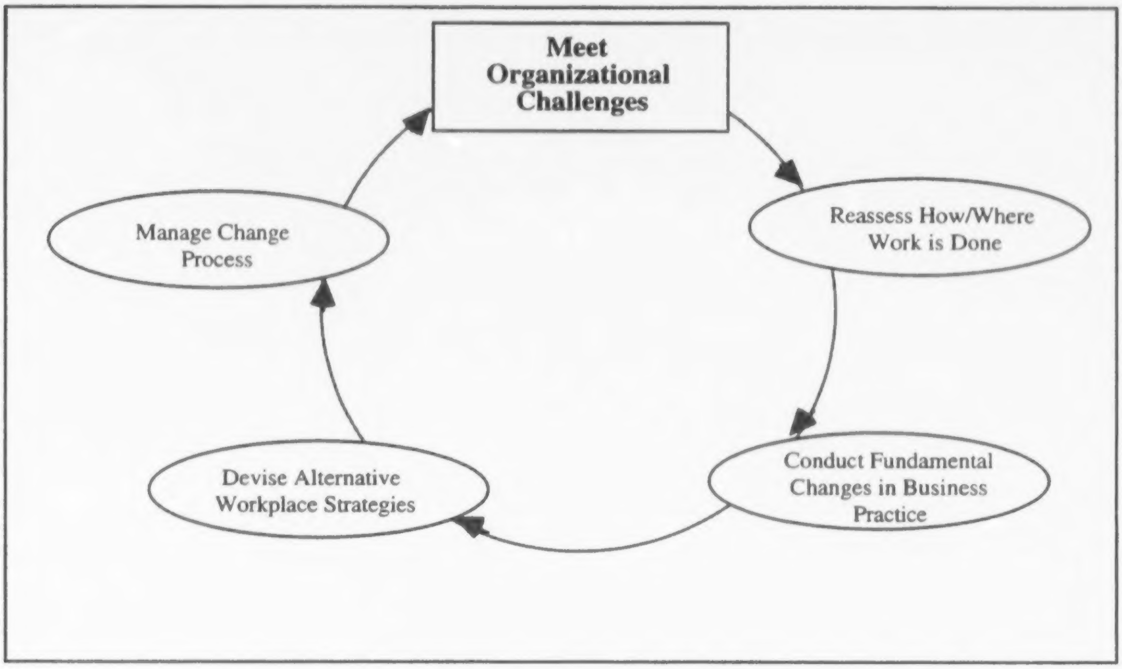
Meet Organizational Challenges
Reassess How/Where Work is Done
Conduct Fundamental Changes in Business Practice
Devise Alternative Workplace Strategies
Manage Change Process

Figure 3: Business-Driven Implementation Process Model

work behaviors and attitudes, and culture than was true of cost-driven strategies.

- When developing alternative workplace strategies, the question for business-oriented strategies was, "Does this strategy represent the most effective environment?" For cost-oriented approaches, the question was, "Would employees still be able to work in this environment without significant reductions in effectiveness?"
- Managing change occurring as a result of the new way of working in business-oriented strategies tended to be more continuous; managers worked at educating and training employees both before and after the innovation was introduced. Using this type of change management approach, many of the initial "teething pains" were eliminated. Cost-driven strategies, in comparison, either did not include this phase of the project, or had to spend a lot of time after the implementation "nurturing" the users to help them adapt to the change.

The "Success" of Business- and Cost-Driven Strategies

User Satisfaction and Work Effectiveness

The mean satisfaction rating for the business-driven projects was significantly higher than that of cost-driven projects (see Figure 4: Overall Satisfaction with Business- versus Cost-Driven Innovations). In the business-driven projects 88% of the respondents rated their satisfaction as "satisfied" or "very satisfied," compared with 40% of respondents in the cost-driven projects reporting that they were "satisfied" or "very satisfied" with the office system.

The difference in satisfaction scores for these two strategies centered around the emphasis of each of the two approaches. In the business-driven projects, the emphasis was primarily on the user; how to create an environment that supported diverse

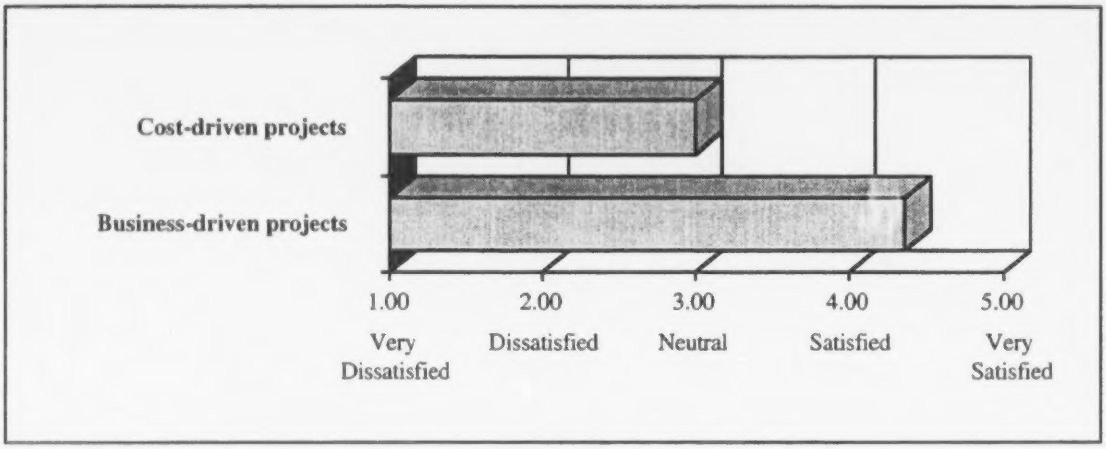

Figure 4: Overall Satisfaction with Business- versus Cost-Driven Innovations

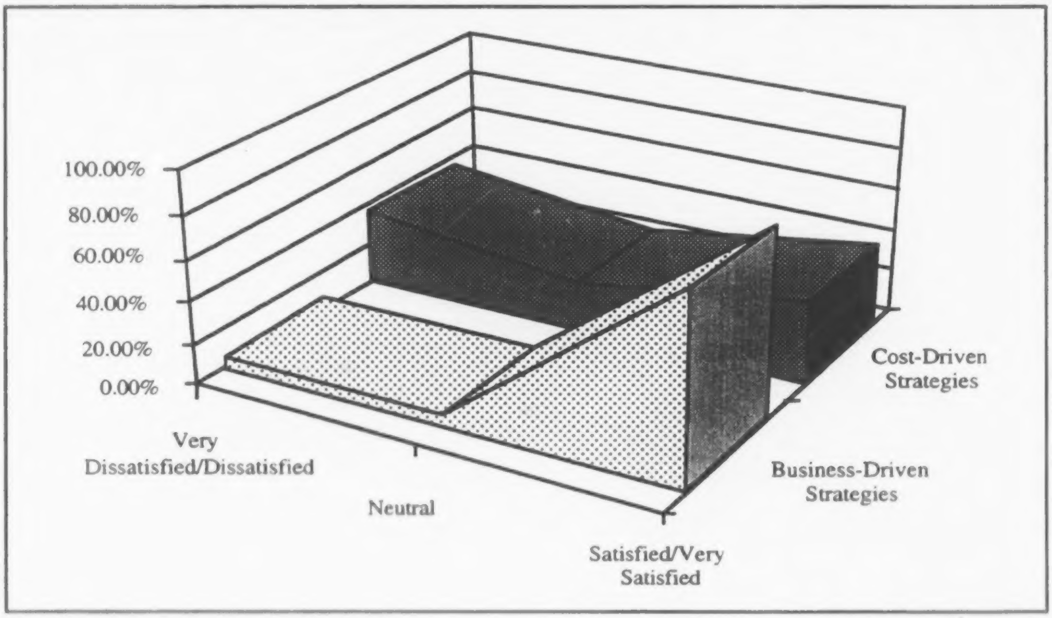

Figure 5: Frequency Distribution for Satisfaction Ratings for Business- versus Cost-Driven Innovations

work patterns and styles, was more efficient, more flexible for the user, and more stimulating and pleasant. In the cost-driven projects, the emphasis was primarily on reducing costs by reducing space requirements for the users.

User satisfaction with regards to privacy issues is a prime example of the different resources devoted to users of business-driven projects. Less than three percent of all respondents in cost-driven projects rated these issues as better/much better, compared with thirty-seven percent of the users of business-driven projects. In projects that are business-oriented, users are most often supplied with alternative work spaces or special function rooms such as conference rooms, quiet rooms, team offices, etc. The provision of such rooms, which is not always possible when the driving force is cost-reduction, allows users to work in a variety of settings depending on the task and the degree of privacy necessary. While it may be more costly for the organization to provide such spaces, the spaces enable the organization to more effectively use a much more expensive and valuable resource—its people.

Cost of the Different Projects

Our assumption had been that the business-oriented projects would be more expensive to implement than the cost-oriented projects because of the more elaborated implementation process and the overall design of the workplace (which often includes much more variety in terms of work settings and a non-corporate feel). Although it was very difficult to obtain detailed cost information from the different sites, the data appeared not to support out initial assumption.

To summarize some of the cost information for business strategies:

- At DECsite, the Natural Office resulted in a reduction in office space from 4650 sq. ft. to 2150 sq. ft.—a move from approximately 388 sq. ft. per person to 135 sq. ft. per person. In later implementations (i.e., the spread of the concept to the entire DECsite floor), the space reduction per person was from 330 sq. ft. per person to 160 sq. ft. per person. The office cost $635 thousand Swedish Kroner (approximately $85,000 U.S.): 335 thousand SEK ($43,580 U.S.) for the furniture, and 300 thousand SEK ($41,420 U.S.) for the raised floor, linoleum, walls and other refurbishment.[1] Management estimated that this fit out cost was higher than it would have been for a traditional Digital office. However, the more than 50% reduction in space requirements and the estimated 20% increase in productivity, even with the onetime cost of fit out and new, special purpose work areas, constituted a very significant annual savings.

- The office area at SOL was approximately 6,500 sq. ft. Although exact figures were not available, management estimated the office cost 30% of what it would have cost them to implement a traditional office. One reason for this is because it cost them very little to build. Employees volunteered their time to help design the office in the five-week time period in which it was implemented. Also, the informal furniture was residential quality rather than commercial , which is less expensive.

To summarize some of the cost savings for cost-driven projects:

- At IBM, the creation of the Bedfont Lakes facility enabled IBM to close three of their previous buildings (Brentford, Richmond, and Chiswick) and house these users at a single site. Without SMART or some other form of alternative office environment, this consolidation would not have been possible; 1,000 users were able to occupy a building that under traditional office space allocation would have housed only 600.[2]

- The second implementation of shared offices at Ernst & Young, housing almost 300 people, represented a reduction in office space of 8,600 sq. ft., and an overall cost savings of $1.7 million in lease savings.

As this data clearly demonstrates, the projects, whether they were business- or cost-driven, experienced a significant reduction in office space and square feet per person. Where the primary difference in the strategies became more evident was in the initial outlay that organizations made to implement the projects. Business projects appeared to have a higher first-cost compared to cost-driven projects. In the long run, however, it is very possible that the ongoing costs for business projects was lower than for cost projects. For many cost-driven projects, project managers had to go back to their original implementations and make changes to the system (e.g., improve the telephone system, improve the technology, add more visitor terminals, change the design concept, etc.). In the business-driven cases the initial implementation worked well from the start. The cost-driven approaches, therefore, appeared to shift the costs from the initial outlay to the ongoing operation of the project.

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[1] Interview with DECsite management, October 1993.

[2] (1992). £100 Million joint venture bears fruit. Corporate Members News. London, England.

Innovativeness of the Projects

Business-driven projects tended to be more innovative than cost-driven projects; that is, they provided a wider range of places to work, and often had a less corporate, more residential "feel" to them. There are several plausible, related explanations for the difference in the degree of innovation:

- A larger proportion of the costs saved by reducing space per person in business-oriented projects were *reinvested* into other functional work areas (e.g., dedicated project rooms, informal meeting areas) that would not have been cost-justifiable under the conventional individually-assigned space standards.

- Business-driven initiatives focused more on understanding the nature of the work processes themselves, including subtle variations between situations that might on the surface appear identical. For example, in cost-driven initiatives, one field sales group was likely to be viewed much like another, even though they served different size or types of clients, in different size areas, with different kinds of transportation infrastructure. In business-driven approaches these kinds of subtle differences were more likely to be probed and understood, and the setting to reflect them.

- All of the business-driven cases had a very strong high-level champion who personally was committed to and enthusiastic about change. These champions wanted to transform their work environments physically, socially, and technologically. As important, they themselves worked in the new environment, living both with the changes in the system and with the reactions of their peers and subordinates. In the cost-driven approaches, while there were strong advocates of the new way of working, they were less often the person who had initiated the change process, and less often worked in the setting they had changed. Typically, these advocates were assigned the job of implementing the new workplace solution; it was their job. The importance of champions in developing and implementing innovative, business-driven solutions cannot be overemphasized.

Process- versus Solution-Oriented Strategies

Essentially, *solution-oriented* strategies are ones in which a basic workplace solution is repeated in multiple sites with minor modifications. *Process-oriented strategies,* in contrast, standardize the principles guiding implementations in different sites, and the process for identifying the most appropriate solutions. The workplace solution itself is likely to vary considerably, however, from one site to another.

Figure 6 shows that solution-oriented approaches omitted or minimized two critical stages that were focal points in process-oriented strategies; namely, reassessing how and where work is done, and reengineering the business processes based on that analysis. Process-oriented approaches involved staff at each site, and in each work group, in the process of planning and designing a workplace solution that worked for their specific needs.

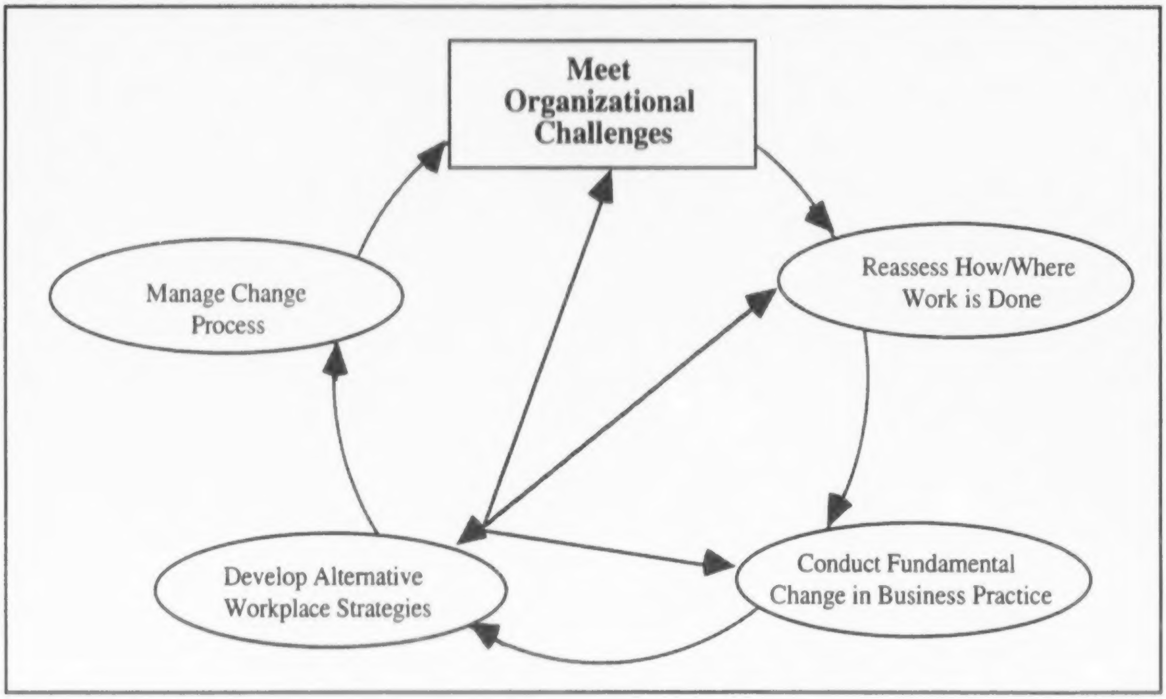
Meet Organizational Challenges
Manage Change Process
Reassess How/Where Work is Done
Develop Alternative Workplace Strategies
Conduct Fundamental Change in Business Practice

Figure 6: Solution-Oriented Implementation Process Model

The "Success" of Process- and Solution-Oriented Strategies

User Satisfaction and Work Effectiveness

User satisfaction ratings for the process-oriented innovation and the solution-oriented innovations were averaged across all of the survey respondents. Because we examined only one process-oriented strategy, our findings should be viewed with some caution.

In the solution-oriented projects the survey responses were distributed fairly evenly across the satisfaction scale (see Figure 8: Frequency Distribution for Satisfaction Ratings for Process vs. Solution-Oriented Strategies). Thirty-five percent of all survey respondents rated their satisfaction with the new office system as much worse/worse than the previous office system, while 42% rated the new office as better/much better, with the remaining respondents rating their satisfaction as neutral. For process-oriented projects, however, the satisfaction ratings were consistently on the upper end of the scale, with 93% of all users rating their satisfaction with the new office system as better/much better.

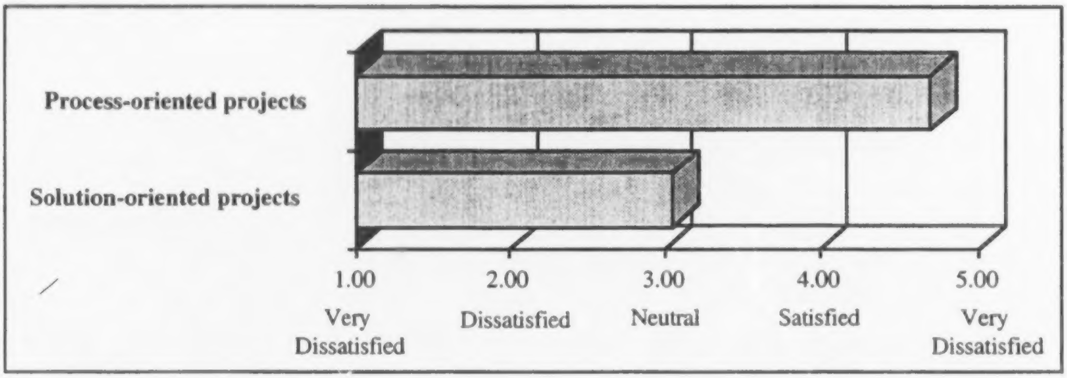

Figure 7: Overall Satisfaction with Process- versus Solution-Oriented Innovations

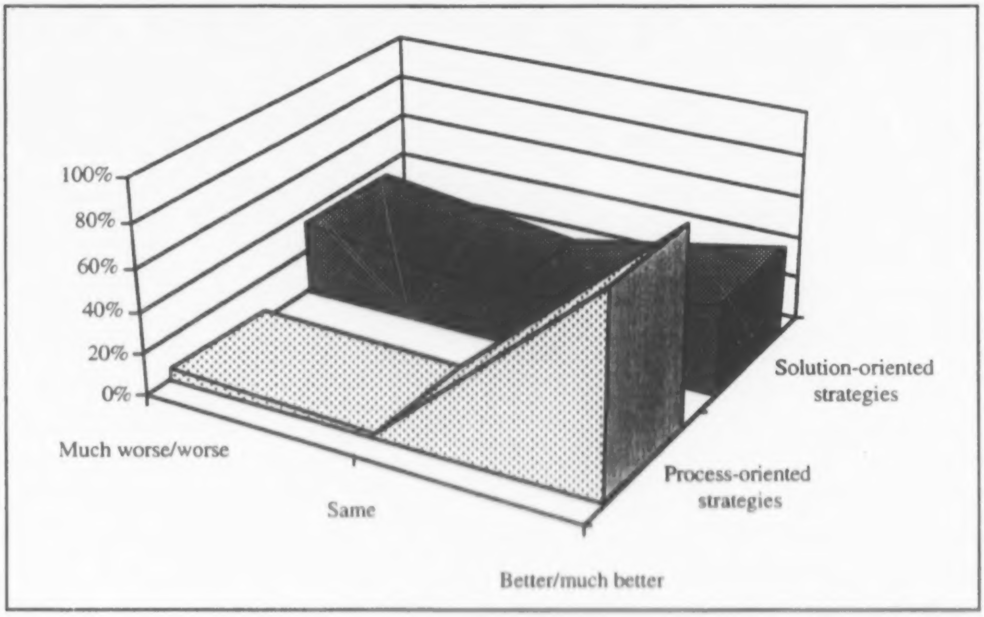

Figure 8: Frequency Distribution for Satisfaction Ratings for Process- versus Solution-Oriented Strategies

User satisfaction with regards to work effectiveness and other issues (home, technology, communication, space/design, storage/personalization, and privacy) were also significantly higher for the process-oriented projects than they were for solution-oriented, with the exceptions of technology and home issues (see Figure 9: Solution- vs. Process-Oriented Innovations: Satisfaction with the Project). Again, this goes back to the focus of the project on meeting the needs of the particular end users.

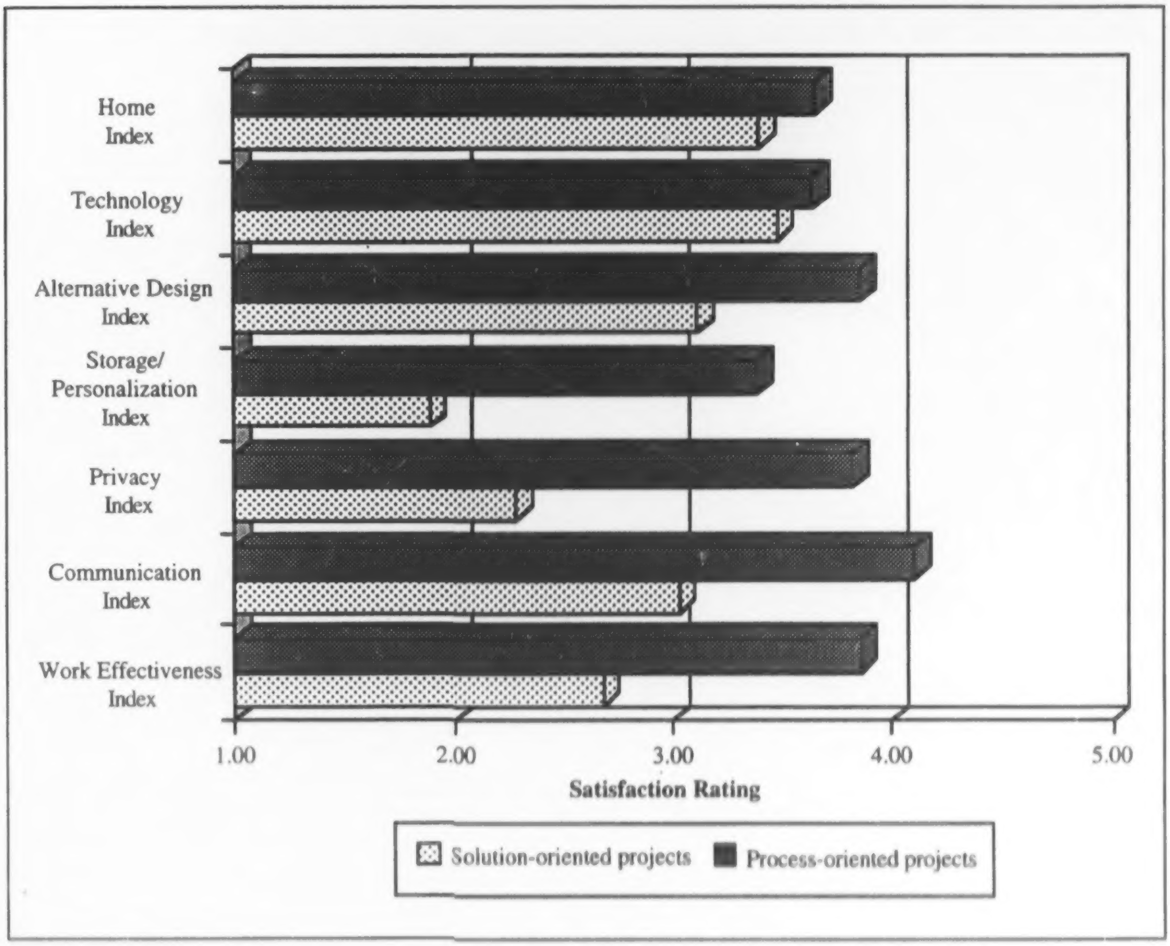

Figure 9: Solution- versus Process-Oriented Innovations: Satisfaction with the Project

Duration of the Projects and the Acceptance of the Innovation Throughout the Organization

The duration and acceptance of the process-oriented projects appeared to be greater than that of solution-oriented projects, particularly with regards to acceptance throughout the organization.

In process-oriented projects, users had more influence over the final solution for the work group. In addition, early users also had "pioneer" status; the users were the first people to try a new concept and often had certain benefits and experiences that people in later implementations did not have. For many employees the excitement of being a "pioneer" participating in a special project can be highly motivating and energizing. Involvement in such projects often creates unusual opportunities to influence one's work and to interact with management and others in the organization in ways that go far beyond those experienced in the day-to-day routines of work. Employees who later work under the new "standard" but without the same opportunities to influence it are likely to react in a less positive way.

Both the above points also bring up another very important issue: the influence a strong champion can have over the success of the project. Champions of the system, especially when they are "converts" or high-level employees (i.e., people that are not easily biased towards the new concept) can help encourage other users who may be skeptical to try the new way of working. These champions will often "take on" the "grumblers" and skeptics, who, for one reason or another, have difficulties accepting the new system. If the users are not as actively involved in the process, it may be difficult to "recruit" these champions because employees do not necessarily see or understand the benefits the system has to offer. The process-oriented project had champions who were working in the new environment and were on board early in the planning stages. In the solution-oriented projects, champions were either nonexistent, were too far removed from the users (i.e., they were not working with the users in their environment), or they had to be "created" by going back into the system and counseling/nurturing the users. This was particularly the case in later generations of the project.

Cost of the Different Projects

Again we saw examples of "pay now or pay later;" the costs were often shifted from the initial outlay to later ongoing costs. The process-oriented projects tended to have their costs up front, particularly with regards to time and effort spent on studying and preparing users.

Strategic versus Independent Initiative Strategies

While we classified the organizations according to whether their innovation was strategic versus an independent initiative, there were, in fact, several variations within this classification. A *strategic* model for implementing an innovation is one that begins from the highest level within the corporation and becomes a corporate standard for doing business.

We found three distinct patterns within the independent initiatives in terms of the innovation's influence on the organization. The first example is what we refer to as a "classic" independent initiative. The classic independent initiative is one where similar innovations occur within separate parts of the organization without an interaction between the different projects. For example, if offices in California and New York both develop a similar innovation without consultation between the two, that would be classified as a classic independent initiative. A second variation on the independent initiative is what we refer to as a "serial" independent initiative; an innovation that begins as an independent initiative, but then spreads throughout the organization. The third variation of the independent initiative is one in which the innovation begins as an independent initiative, but then later becomes a strategic initiative.

Table 2 is a refinement of our original classification table to take into account these variations within the strategies.

There appeared to be no consistent pattern according to whether the innovation was strategic or independent. In almost all of the cases we examined, the tendency was to try and standardize aspects of the process, regardless of whether the innovation was strategic or independent. In most cases, the project managers used an abbreviated process cycle in later installations.

Table 2: Review of Implementation Process Strategies

	Strategic vs. Independent
IBM, UK	Strategic
Ernst & Young, UK (MCS)	"Serial" Independent
DECsite's Natural Office	"Serial" Independent
SOL Headquarters	Strategic
Shimizu	"Serial" Independent
(Digital Equipment Corporation —UK, Finland, Sweden)	"Classic" Independent
(Ernst & Young, US)	Independent-to-Strategic

Parentheses indicate companies we did not study for this project, but for which we have information through our own research or research conducted by outside sources.

The "Success" of Strategic versus Independent Initiatives

User Satisfaction and Work Effectiveness

The mean scores for the two strategic projects (SOL, IBM) and the three independent initiatives (Ernst & Young, DECsite, and Shimizu) were averaged across all of the survey respondents. When the difference in the sample sizes was taken into consideration, there was no significant difference in the satisfaction means ($t= 2.054$, $df= 534$, $p= 0.0404$).

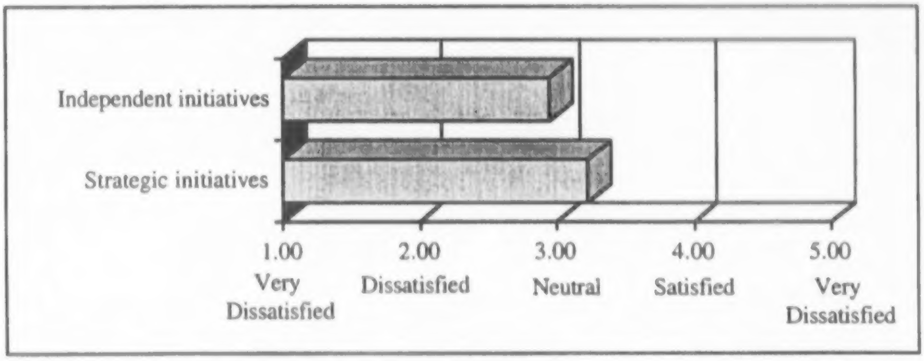

Figure 10: Overall Satisfaction for Strategic versus Independent Initiatives

User satisfaction means for work effectiveness and other issues in the new office environment (home, technology, space/ design, storage/ personalization, privacy, and communication) were also generally about the same ($p > 0.05$).

Duration of the Projects and the Acceptance of the Innovation Throughout the Organization

As was the case with the other measures of success, there did not appear to be any patterns in the lifetime or acceptance of the projects according to whether they were strategic or independent.

Cost of the Different Projects and Organizational Learning

For strategic and independent initiatives, it seems appropriate to discuss the cost of the projects and the organizational learning that occurred within the organizations together; much of the savings between the organizations was as a result of this phenomenon. As mentioned earlier in this section, the common tendency among all of the initiatives was to try and condense the implementation process for later projects. The desire to omit phases of the process was based on the premise that certain things were learned from previous projects, and therefore did not need to be emphasized as strongly in later projects. Strategic and serial independent initiatives seem to be very parallel in this characteristic. Because the alternative workplace strategies had been developed in previous projects, the reassessment phase was eliminated from the process, and the data collection period was eliminated or less emphasized (e.g., using prescribed ratios based on general occupancy data decreased the data collection—time-lapsed photography—from one year to one week, etc.).

Innovativeness of the Projects

In terms of innovativeness, it again appears that there was no difference according to whether the projects were part of a strategic or independent initiative. In our sample, we had examples of both strategic and independent initiatives that were innovative in their own right.

Summary of Workplace Strategy Comparison

Table 3: summarizes our findings for each of the implementation strategies when compared to our measures of success.

Table 3: Which Approaches Outperform Their Counterparts?

	Business vs. Cost	**Process vs. Solution**	**Strategic vs. Independent**
User satisfaction	Business	Process	—
Work effectiveness and satisfaction by issue	Business	Process	—
Lifetime of the project	Business	Process	—
Acceptance throughout the organization	Business	Process	—
Cost (less expensive in terms of time, resources)	—	—	—
Innovativeness of the project	Business	—	Classic Independent
Organizational learning	—	—	Strategic/Serial Independent

Our predictions at the beginning of the study for cost- vs. business-driven projects was that the cost-driven projects would be more standardized, place less emphasis on the process, have less innovative workplace solutions, and be less self-sustaining (shorter lifetime) when compared to business-driven projects. As Table 3 illustrates, our findings generally concur with our original hypothesis in all areas.

Our predictions for process- vs. solution-oriented projects were that solution-oriented projects would be less innovative, have a shorter implementation process, be more standardized, and be less expensive to implement when compared with process-oriented projects. Again, our findings are generally in line with these original hypotheses. There were, however, exceptions to our predictions. For example, The Natural Office was very innovative in its workplace solution for a flexible office, even though it was solution-oriented. Subsequent iterations of the project, however, will in all likelihood bear our hypotheses out.

In terms of strategic vs. independent initiatives, our findings do not necessarily concur with our original hypotheses. We expected that we would see more organizational learning with strategic initiatives than we would with independent initiatives, and that independent initiatives would be more expensive and more tailored to the individual group. In the course of our research, however, we found that there were multiple variations of independent initiatives, including classic independent, serial independent, and independent-to-strategic initiatives. Our predictions were most accurate for classic independent initiatives. Serial independent initiatives, on the other hand, seemed to parallel strategic initiatives in the amount of organizational learning occurring from one implementation to the next, as well as in the tendency to standardize the solution.

Summary of Key Findings

The following section summarizes our findings for each of the key research questions posed in the *Introduction* of this report as they apply to all of the organizations in our research sample.

- *What factors (i.e., planning and design process, nature of technology, the design of the setting) tended to change the most as projects evolve?*

As the projects evolved, the biggest changes that we witnessed occurred in the planning process. Referring to the implementation process model, many of the projects omitted or did not emphasize certain aspects of the process, particularly in later generations. The primary components that were left out of the process were the reassessment of how/where work is being done (i.e., work patterns), fundamental changes in business practices (i.e., training, changes in work processes, changes in management practices/philosophies, changes in work behaviors), and the development of alternative workplace strategies that were tailored for each group of end-users (i.e., implementing a "standard" solution).

Design and space, while they seemed to be refined over time, were generally more stable across the implementations. Most of the changes that we saw in the design and space were "evolutionary" changes occurring as a result of advancements made in technology or refinement of a standard design based on organizational learning.

- *What aspects of the new workplace system tended to become standardized or uniform?*

The actual workplace solutions tended to be quite standardized, especially in the solutions-oriented projects that predominated in our sample. To decrease the time and resources spent in the planning process, project managers would take an environment created for one group (based on their work patterns and needs), and implement it for another group, making mostly minor changes in the solution. In terms of the design and technology, this, too, appeared to be standardized in line with the solution. We did see some variations in technology and design over time as technology improved and design became more refined, but these aspects were meant to support the standard solution, and often became standardized in the process.

- *As organizations expanded their implementation of new workplace strategies (within or across sites) did employee response tend to consistently improve, remain the same, decline, or was their no consistent pattern at all?*

Whether user satisfaction improved or declined appeared to depend on the approach to implementation. In cases where the implementation process emphasized all stages of the implementation model or had the same emphasis as in earlier projects, user satisfaction stayed the same or increased. When phases were omitted from the process, user satisfaction generally declined.

- *What differences were there in terms of cost and employee response (satisfaction, work effectiveness) as a function of whether the workplace system was primarily cost- versus business-driven ?*

As discussed in the previous section, business-driven projects tended to outperform cost-driven projects in terms of user satisfaction, work effectiveness, project duration, and acceptance throughout the organization. They also tended to have more innovative workplace solutions.

- *What are the organizational implications of solution- vs. process-oriented workplace system?*

Similar to business-driven models, process-oriented projects outperformed solution-oriented projects in terms of user satisfaction, work effectiveness, duration, and acceptance throughout the organization. In general, they also tended to have more innovative workplace solutions, although there were some exceptions. Solution-oriented projects, however, were generally less expensive to implement.

- *How did the implementation process change as the project moved from the small projects to widespread implementation? Was it necessary to focus as much attention on all three factors (design, technology, and planning process) in second and third installations to ensure similar success patterns as those achieved in the pilot project?*

As the projects moved from a small scale to wider implementation across the organizations, the implementation processes became less intensive; phases of the process, in particular those related to careful assessment of the nature of the work process, were either omitted or emphasized less in later implementations. Our findings indicated that process was one of the most important factors contributing to the success or failure of the project, including the organizational objective of the project.

The design and technology did not have as great an impact on the overall success of the project. In fact, as less attention was placed on the process and more on the design and technology over time, user satisfaction and work effectiveness actually decreased in several of the sites we studied. This was despite the fact that in several cases the technology was significantly improved over time (i.e., lighter, faster laptop computers were supplied; telephone systems were enhanced).

It would appear that user expectations about technology are likely to always exceed what technology is available in the office. Given the speed of new product introductions in the technology arena, very few companies, if any, will at any particular moment have the latest version of software and hardware available on the market. Thus it is not surprising that, despite introducing new technology, user satisfaction remained stable or even declined.

- *What was the nature of organizational learning that occurred as a function of whether the workplace system was process- vs. solution-driven, cost- vs. business-driven, or part of a strategic versus an independent initiative?*

Organizational learning appears to be primarily linked to whether there was consultation between the sites. For example, the serial independent initiatives and the strategic initiatives both exhibited organizational learning. In serial implementations, the original site helped in establishing subsequent installations. Those sites had the benefit of hindsight from the earlier projects, as was also the case with strategic initiatives. Classic independent initiatives tended to have less organizational learning (or it was harder to come by in that they had to conduct their own research of similar implementations either within or outside their organization).

We found that organizational learning was not limited to any single component of the process, but occurred across all aspects (e.g., technology, design, management practices and philosophies, etc.).

Lessons Learned

The findings from our case studies suggest that the following factors are critical to successful implementation of alternative workplace strategies involving non-territorial offices:

- The presence or absence of a strong champion is very important to the success/failure of the project. In cases where there was at least one strong champion of the innovation working closely with the end users, user satisfaction and acceptance of the innovation was much greater. Situations where the champion worked in the new workplace were more likely to be business-driven and process-oriented than those which were led by persons assigned as part of their job to implement a new workplace strategy.

- Many issues management may feel are barriers to implementing innovative ideas are *perceived* barriers. For example, storage, personalization, and privacy were all issues that managers focused on when trying to implement an alternative workplace. Satisfaction with these factors tended to decrease as the result of implementing alternative workplace settings that involved non-territorial or open environments, but these issues were also very low on users' list of priorities. Users did not seem to be as sensitive to these issues as managers expected.

- Few companies had implemented an *integrated* workplace strategy; that is, one in which users have access to a wide array of settings both inside and outside the "office" (e.g., dedicated project rooms; quiet rooms; informal break areas in the office; home; client site; airports; hotels; etc.) supported by appropriate technology, business processes, and organizational culture. Eliminating ownership of a desk, office, or workstation without providing a richer, more varied set of work settings that truly support the full range of work activities will generate resentment, dissatisfaction, and lower levels of performance.

- The organizational challenge encouraging organizations to implement innovations is very important. Organizations taking a business-oriented approach seem to have more success in implementing the innovations than those taking a cost- or real estate-oriented approach. A business-orientation gives managers and employees more incentive to implement the innovation, and more incentive to make changes in business practices (including management philosophies and practices, corporate culture, etc.). The business-oriented approaches recognize that the workplace is a complex system in which all elements must work in harmony, rather than simply being a change in how space is assigned.

- User involvement is very critical to the success of the project. It is costly and time consuming, but it is necessary to ensure that the workplace strategy fits the employees' needs and requirements, that they understand the nature of the innovation to be implemented, and that they directly experience the benefits of implementing the innovation. The implementation process in business-oriented approaches becomes, in fact, a form of organizational development. It helps people think about the nature of the work they are doing, why they are doing what they are and in the particular ways, and it helps them focus on identifying and inventing better ways of working.

- Significant cost savings occur in both business-driven and cost-driven approaches. However, in the business-driven approaches, a portion of the savings associated with increasing the ratio of people to offices or workstations is reinvested in specific types of functional areas (e.g., dedicated project rooms, informal meeting areas, quiet rooms) that would not otherwise be feasible. Our data indicated that reinvesting a portion of the cost savings was likely to result in a far higher level of employee satisfaction and self-reported productivity than in the more purely cost-driven approaches.

- Using a pilot project as a laboratory from which a standardized solution can be developed and then applied—cookie cutter fashion—company-wide was associated, in our study, with significantly lower levels of employee satisfaction and productivity. One of the "gets" for those employees who "give" up their ownership of a personal workspace is the opportunity to help create a solution that is tailored to their group's particular work patterns and needs.

- Eliminating the reassessment and data collection phases of the process, or emphasizing these phases less strongly, will save money and time up front. It is likely, however, to require revisiting and modifying the original workplace solution to a greater extent than occurs when these phases of the implementation process are included from the beginning. In effect, organizations have the freedom to "pay now or pay later."

- Related to the above point , employees asked to work in significantly different ways need time and help to develop effective work patterns. Champions who model the desired behavior are a very effective means of helping people learn new behavioral patterns; formal training and support is also important, especially in learning how to use new technologies.

- Some of our most interesting and innovative examples were found in Scandinavia (i.e., SOL in Finland and DECsite in Sweden). Rather than the culture per se being the critical factor, however, it would appear that the critical factor is the presence of a strong champion with a vision of how the alternative workplace might look and operate. Examples like Chiat/Day in Los Angeles, and Work/Family Direction in Boston—both of which have recently implemented very imaginative workplace solutions that mirror in some ways those of SOL and DECsite—had, in fact, very strong executive champions. This, more than that the firm was American or Swedish seems to account for the more innovative workplace.

In the final analysis, one way to conceptualize some of the differences we found is in terms of control; or more precisely what it is the organization wants to control. For most of the organizations we studied, the focus of control was on reducing costs. For a few, the focus was on creating a better way of working, using new ways of assigning space to break down conventional thinking about what constitutes the most effective way to work. What is the bottom line for organizations? It is the difference between saving costs in the short run that may reduce the effectiveness of the organization's most expensive resource, and reinvesting cost savings from using space in new ways to support new work patterns that enable employees to work more effectively and productively. The latter approach views culture change not as an undesirable side effect of assigning space in new ways, but the goal itself.